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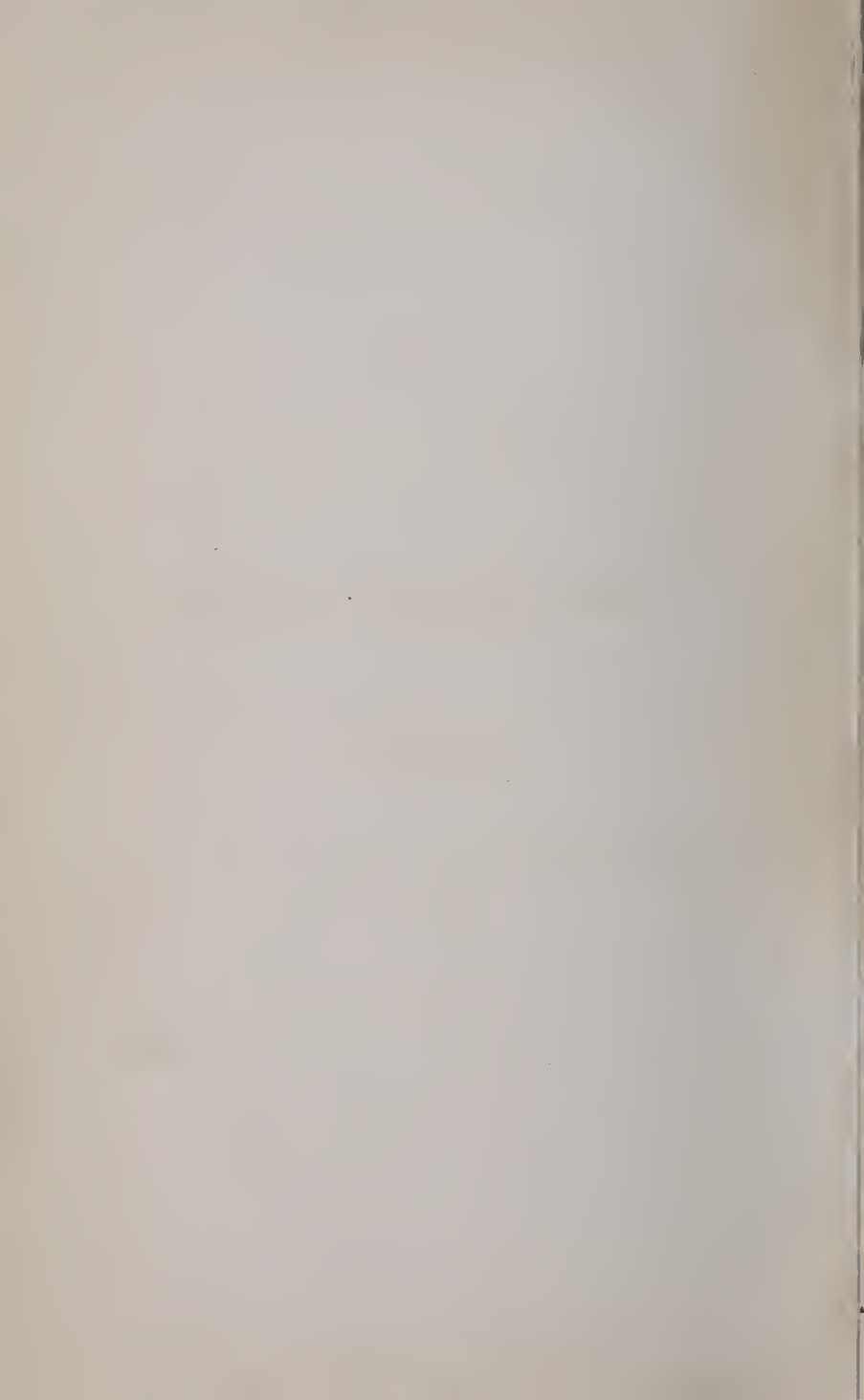
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THE  
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OF  
**THE ASIATIC SOCIETY**  
OF  
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VOL. III.

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THE  
JOURNAL  
OF  
THE ASIATIC SOCIETY  
OF  
BENGAL.



EDITED BY  
JAMES PRINSEP, F. R. S.  
SECRETARY OF THE AS. SOC., AND HON. MEM. OF THE AS. SOC. OF PARIS.

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VOL. III.

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JANUARY TO DECEMBER,  
**1834.**

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“ It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta ; it will languish, if such communications shall be long intermitted ; and it will die away, if they shall entirely cease.”

SIR WM. JONES.

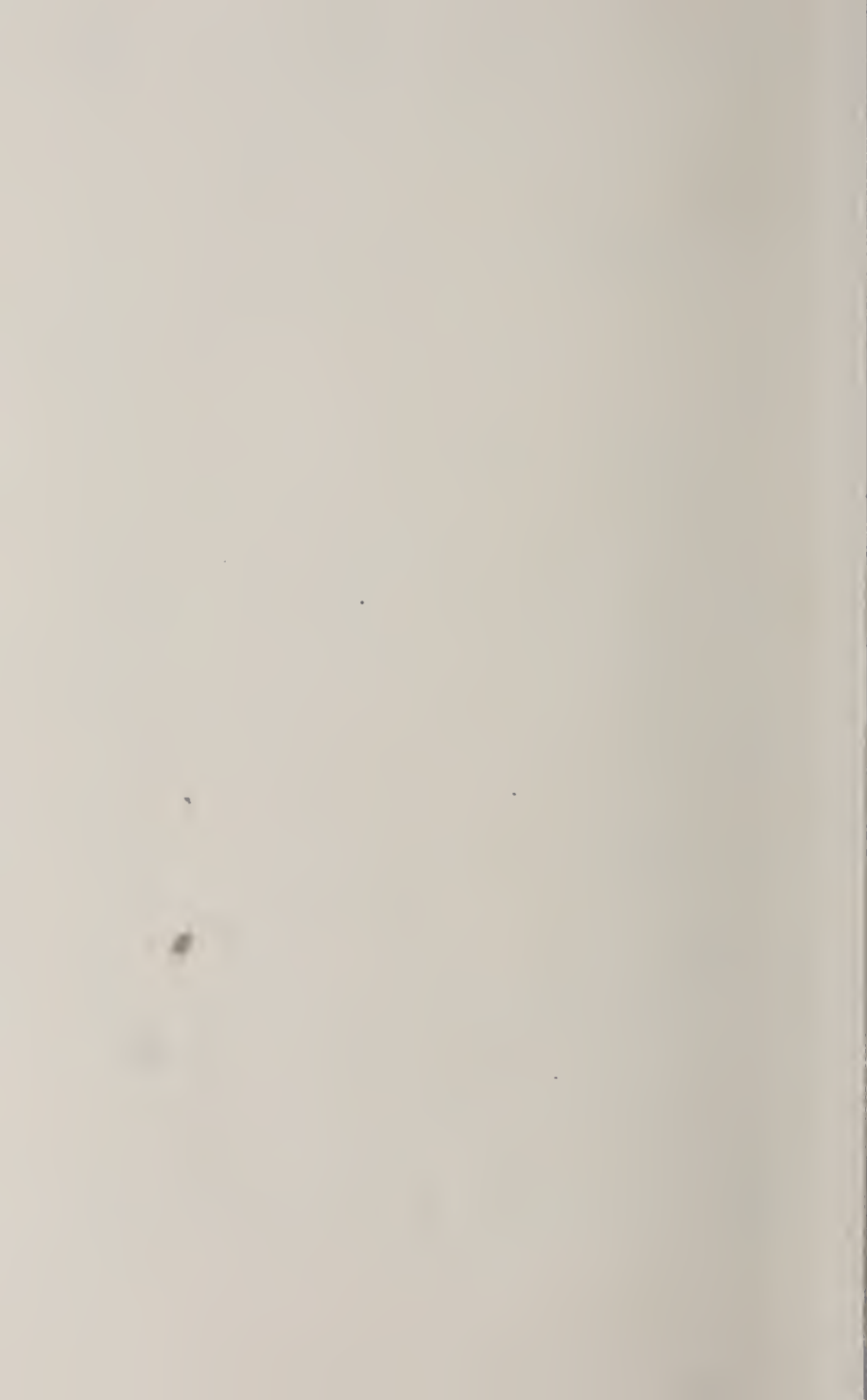
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1834.



# JOURNAL

OF

## THE ASIATIC SOCIETY.

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No. 30.—June, 1834.

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I.—*Restoration of the Inscription, No. 2, on the Allahabad Column. By the Rev. W. H. MILL, D. D. Principal of Bishop's College, Vice-President of the Asiatic Society, &c.*

[Read at the Meeting of the 28th ultimo.]

THE March number of the Journal of the Asiatic Society contained the result of the Pandit MADHU RAO's collation of the Allahabad Inscription, No. 2, with others in a similar character—together with Captain TROYER's English version and valuable remarks. The learned Pandit's transcript exhibits such letters only of the pillar in Devanagari as were capable of tolerably certain identification with those found on monuments already deciphered, leaving frequent and often considerable intervals for the remaining letters: and the version, as was indeed unavoidable from such a text, presented still wider intervals. The translation of many of the clauses thus insulated was necessarily of a conjectural kind: and except in the valuable discovery of lines 25 and 26, where the Prince's genealogy occurred, contained nothing like a connected sentence.

A cursory inspection of the transcript and the version convinced me that, where so much was done, more might be certainly attained. To those acquainted with the art of deciphering unknown arbitrary characters in any *known* language, it is needless to remark that the clear possession of a key to two or three common letters, necessarily draws after it the discovery of all the rest: and that where the further progress of discovery is really barred, it is an infallible proof of some error in the previous assumption. No such error was suspected here, (except in some comparatively inconsiderable instances, which may be seen by any one that will take the trouble of comparing the two transcripts together;)

and therefore nothing could impede the progress to deciphering the inscription as far as it remained—provided only the language in which it was written were sufficiently known to us.

Now that this language was the well-known classical Sanscrit—the language of MENU's Institutes, the Puránas, the Kávyas, &c. admits of no reasonable doubt. The supposition of its being any older Sanscrit, resembling that of the Vedas, to the understanding of which a *bhāshya* or gloss is all but indispensable, is rendered extremely improbable by the apparent date of the monuments on which inscriptions of the same character appear. The style of the Gya Inscription, so satisfactorily deciphered by Sir CHARLES WILKINS in the 1st volume of the Asiatic Researches, and the metre in which it is composed, the *Sardúla-vikrídita*, (which, like all other lyrical measures of that kind occurring in the Hindu drama and elsewhere, belongs to a period in the history of the language long posterior to that of the great sacred epics, the Rámáyana and Mahábhárata, by which the present classical Sanscrit was fixed,) would alone be sufficient to remove such a supposition.

With this conviction, I determined to subject the Allahabad Inscription to a close critical examination; discarding in the first instance all reference to other interpretations of the inscription itself, and proceeding only upon the indubitably deciphered letters of the above mentioned Gya Inscription, or rather of that portion of it, of which Lieutenant BURT has now given us a far better fac simile than what is contained in the Society's first volume. Applying this to his excellent copy of the Allahabad Pillar, though at first the limits of discovery appeared no wider, and indeed much narrower, than in what has already been presented to the Society, yet by carrying on the results of what was thus ascertained, wherever any glimpses of decided meaning appeared, to the investigation of characters before unknown, and testing the conjectures thus made by other places—the usual result of such inquiries displayed itself. What was at first mere assumption turned to probability, and then to certainty: and such places as the juxta-position of the names of known countries in line 19, but above all, the short clause in line 27 on which the rest of the inscription hangs—(*ravi-bhuvó báhur ayam uççhrítas stambhas*, “of this Sun-born king THIS LOFTY PILLAR IS the arm”)—occurring as they did to me not as the basis of conjecture, but as the unexpected results of inferences from other probable assumptions,—removed all possibility of doubt. And notwithstanding the turgid character of the composition, and the enormous length of the epithets affixed to this “child of the Sun,” consisting often of more than 25 words, and filling the whole line—the meaning is sufficiently connected and definite in this, which is the greatest part of the inscription, to remove all doubt

of the accuracy with which Devanagari letters are assigned to the several characters\*. In one only of the regal proper names, that of the king's grandfather GHATÓTKACHA, does my reading differ from Captain TROYER'S: and it is observable that this is also the name of a son of the Pándava hero BHÍMA SENA, brother of YUDHISTHIRA and ARJUNA in the Mahabhárata, and might perhaps have given rise to the popular appellation of this pillar in Hindustan, "the Staff of BHÍMA SEN."

The test arising from *definite and continuous meaning* applies of course only to those parts where the inscription is itself complete, and clear of all considerable interruption, viz. all from the 14th to the 29th lines inclusive, (for the 30th is separate from the rest, and appears broken off like the earlier lines,) perhaps also the 2nd and 3rd, which, though short, seem to me to be very nearly complete. But even in the other lines, the *words* and the *compounds* are intelligible: and if we except the 1st, and the end of the 6th, lines (the first containing but nine insulated letters, and the last breaking off in the midst of a compound, leaving the preceding words *in that compound* uncertain as to their bearing)—the separate clauses may be pretty well traced, though their import in the sentence is lost. In all these, lacunæ of various lengths occur in the pillar, which I have scrupulously filled up with precisely the same number of letters as are designated by Lieutenant BURT for the several intervals. It is not by any means intended to ascribe to these added† letters of my own, (except when the interval is very small, as in line 24,) the same degree of accuracy which I should be disposed to claim for all, with one or two exceptions only, of the *transcribed* letters: for the most part they merely indicate the probable (and in some cases of very marked meaning, as in line 28, the certain) *equivalents* of the letters that formerly occupied the same spaces. Where lacunæ occur at the end of a line, I had no such consideration to guide me: here, as in lines 18 and 26, it was merely my object to close the imperfect compound by as few letters as would serve the purpose of expressing the evident meaning. In the earlier lines, the idea of completing the *sentence* by such means was out of the question.

\* In one instance I was assisted to the meaning of an ill-defined letter resembling a ष in the accurate fac-simile,—by the partial specimen of the inscriptions on the pillar given in the 7th Volume of the As. Res. (Plate xiv.)—which though very inferior in accuracy to Lieutenant BURT'S, yet having been taken at a time when the pillar had not been so much defaced as at present, may be conceived to convey some characters more perfectly. The character was there ष distinctly, and as this happily made sense of what was before unintelligible, its accuracy could not be questioned.

† These letters are distinguished in the transcript by a much smaller character.



To the Devanagari transcript is annexed a close interlineary version, in the only language (one excepted) whose freedom of collocation and general analogy to Sanscrit made it available for this purpose—distinguishing always by brackets the version of the intercalated or added syllables, the necessity of which will thus be often apparent to the Western reader. I have now to subjoin a somewhat looser version in English—to which I would prefix merely the following brief analysis of the inscription.

LINE. 1. Unintelligible, and most probably unconnected with what follows.

2, 3. Invocation in behalf of the sculptor and blackener of the letters of the inscription.

4—12. Various descriptions, at first dependent on the relatives *yas*, *yasya* (who and whose), but afterwards governed by the antecedent personal pronoun *sa*, (he,) all of which evidently relate to the same person, and that the king—but which, from the incompleteness of the lines, and the absence of verbs governing the principal substantives, cannot be traced in their conjunct meaning as one sentence, which it is evident they must have composed.

13—27. Panegyric descriptions of the same king in the genitive case, (connected at first with the nominatives of line 13, but afterwards evidently with the Pillar-Arm at the conclusion.) viz. SAMUDRA-GUPTA, SON OF CHANDRA-GUPTA, of the Solar race, all sufficiently perfect and intelligible.

28. Comparison of the king's glory to the sacred water of the nethermost Ganges in the Mahabharata.

28, 29. Name and description of the self-satisfied author of this panegyric, (whose intellect, as he tells us himself, was utterly subverted by his intimacy with the great king, when he ventured on this composition,) concluding with a salutation to the Deity.

Then, after a very wide space, comes

30. A compliment, somewhat obscure and imperfect, to the author's immediate superior and patron.

#### TRANSLATION.

1. *The jackal [left the b]ear in the forest. (?)*
2. This goodly s[ign] of one endued by nature with a mind of fire having been, for the conveyance of his commands, covered over with ink; may the ma[ker also] fixed [as the letters themselves by the durability and immortality of the monument he has raised, viz.]
3. The [king's] dependant VITKA, having formed these [letters] for the love of the multiplied virtues of the son of the bow-armed SIVA [viz. GANESA patron of letters] enjoy in heaven, even in the city of VEDHAS [BRAHMA] himself, the royal glory of eminent poetical dignity!

4. He who while worthy of eulogy, yet by means of informers, whose character is much to be concealed, men whose hair is diminished by being often pulled, was entangled and impeded by the pride of men of obscure family, a hoary-headed counsellor being - - - - -
5. He who was distinguished in letters, even by the able ontologist CHAXAS, called familiarly the talking Guru, with the honourable appellation of one in whom all [admirable qualities] are united. - - - - -
6. By this [excellent Guru.] resembling those [true sages] who are utterly alien from all delight in selfish worldly occupations, - - - - -
7. He, having been inflamed with warlike prowess, before whom prostration being made even by the enemies' forces, the conjoined battle strife of armies disappeared, - - - - -
8. Whose mothers-in-law\*, formerly proud and addicted to high minded oppressions perpetually, having been by his own arm subdued with the sword of battle, [viz. SANHA'RICA' and the rest, - - (line 18.)] - -
9. By their passions, at first fiercely erect and tall as the stalks of green barley, at length bursting forth and ripening into affection through the abundant juices within, thus became penitent [in heart permanently from that time ; and]
10. When, sprung from the bank of the [sacred?] river, the strength of the arm of RA'XASA and the rest, directing his arms, had even removed mountains by the death of the formidable [rapid victor] XANAJIT,—then he also
11. With assiduous offerings to the planetary deities—did in his own pleasure gardens, from which are gathered noble garlands of flowers woven as it were from the Sesbana grandiflora—[seek to propitiate the immortals].
12. But though the glories of greatness, of clemency, and of warlike prowess were in him blended into one, as [the several colours] in the pure white rays of the moon ; yet was there at this time no [remission of his past grievous offence.
13. Still not his was the path of those devoted to the present life, nor any dereliction of the wisdom and power which belongs to contemplative sages ; nor was there any poetical censurer of him, whose gifts were without end.

\* The great Rajas of India have frequently been polygamists—and in these cases, the father and mother of each wife, as well as those of the sole rightful queen, bear the honourable names of *svasura* and *svasú* (*socer* and *socrus*), i. e. father and mother-in-law. The mothers-in-law here appear to have been independent princesses, whose daughters were thus won in battle by SAMUDRA GUPTA, and seem to me undoubtedly those, whose homage to the conqueror is described as increased by their alliance and hope of royal offspring, in lines 18, 19. With respect to the grievous sin for which his repentance is recorded in line 12, the incompleteness of the line precludes all but the merest conjecture.—On the 6th and 7th lines it may be remarked that the heroic ages of India afford examples of Brahmanical *military* tutors to young Rájjas,—who like DRONA are said to have united great skill in war to eminent contemplative devotion.



14. Of him therefore, skilled in the due performance of the hundred libations of consecrated *ghee* to BRAHMA, who by the strength and power of his arm reduces his foes to bondage, and brandishes for the destruction of their hosts barbed darts and swords and lances\* ;—
15. Of him whose salvation is in the guardian of waters [VARUNA] the terrible SIVA and VISHNU, surpassing the graces of the most adorned recited speech by the rising splendours of a name illustrious for the hundred wounds inflicted on the [rival] tribe by strokes of the flesh-devouring arrows of iron, as well as of weapons grasped by the hand and others ;—
16. Of him, who after the royal insignia had been destroyed by the hand of the [hostile] monarch, as it were the tiger of the forest, the great lord of wild buffaloes,—yet having from the resources of his excellent guardian GIRI-KAHLA'RAKA the gift of infantry and other soldiers—became by the mixture of this benevolent aid with the royal majesty that sprang from it, no longer unfortunate ;—
17. Of him whose mind was next intent upon the capture of all the kings of the South and of the East, as well as of DHANANJAYA, protector of the North country, springing from the race of the divine UGRASENA, splendid as the sun, and patron of HASTIVARMAN—a bard equal to the blue sovereign [SIVA ?] himself ;—who therefore is justly worshipped by his ministering lieges, as sole king of all the gods ;—
18. Of him whose state might be propounded as an object of imitation, in respect of troops, chariots, and other [war-like apparatus] even to the divine RUDRA, the wise NAGADATTA, to CHANDRA [god of the moon] to VAHNI [of AGNI, lord of fire], to GANESA, to NRIGA, [brother of IXVACU, of the solar race], to NAGASENA, and to the unmoveable forces of the NANDIS [SIVA's attendant gods]—and who moreover by SANHA'RICA' and all the rest [of the vanquished mothers-in-law] who have the accumulative incentive of the wish and prayer for a royal offspring, is approached with all just payment of tribute, with propitiatory gifts, and with reverent prostration ;—
19. Of him who when his fame penetrated to the friendly province of Pines—to *Cámarúpa* [the present kingdom of Assam]—and to *Nepal*, did for the sake of procuring a shower of darts to pierce the princes even of the extreme west and other quarters, dispose his soldiers in ambush behind the stations of the cowherds of *Madra*—and is therefore celebrated by the poet whom this battle raised up [to commend the strata-gem], as equal in the rapid destruction of his foes to the Lord SIVA, or to CAMA or ARUNI, [the gods of love and fire—thus celebrated] also by SANHA'RICA' and all the rest [of the allied princesses] ;—
20. Of him whose government is invariably strict—who moreover has the glory, a glory pervading the highest heaven, of largesses to destitute persons, invited by him in pursuance of the restitution of a royal race sprung from a kingdom which the [enemies] soldiers had subverted—

\* Or “iron clubs.” For the Sanscrit तौसर bears both meanings.

- who moreover imposed on the rank foliage of forests, on the lakes, and on the land, the chains [of clear roads and of bridges respectively]—who on the earth has no equal as a car-borne warrior ;—
21. Of him who bears a gentle and kind disposition, to be hailed by the inhabitants of all the islands of the ocean with pure constant worship of oblation and sacrifice—the materials of which spring from the rich revenues obtained by his wise assessment from the produce of cultivators firmly and devotedly subjected to him as was the bird GARUDA to VISHNU, [a devotion testified] by the harmonious confluence of their loyal words and songs addressed to himself—who also without being addicted to works [alone, but spiritual science also, yet] bestows hundreds and thousands upon the affairs of heaven and of earth ;—
22. Of him whose glory in war obliterates that of all other kings beside himself, by reason of the multitude of virtues, diverse in kind, embellished in hundreds of poems—from fear of whose [vigorous rule] dissensions never arise—who is alike pure from the stains of grief and of foolish laughter—who is in devotion unrivalled—and who having by his own arm subdued so many kings, has succeeded further in taming the so great fury and wrath [that such reverse naturally produces] by the continual intercourse and profit of the western commerce begun with the riches derived from that conquest ;—
23. Of him who is pleased with long poems of victory closely following the battle-array formed by the king himself, whose disposition is that of the [Supreme Lord, the] Lord of the Poor ; who is at the same time the slayer of elephants that smite in war—and is consecrated as the most excellent of learned kings by [CUVERA] giver of wealth, by VARUNA, by INDRA, and him who dwells in the mansions of death [YAMA] ; who is renowned for noble exploits to be heard to distant times, and sounded even to heaven ;—
24. Of him by whom are well understood, the GANDHARVAS or celestial songsters, learned and of excellent wisdom ; also the regent of the planet Mars ; also [BALARA'MA\*] foe of the earth ; also the preceptor of INDRA himself, the lord of the thrice-blessed immortals [viz. VRIHASPATI, regent of Jupiter] ; also TUMBARU [the wise GANDHARVA], and NA'RADA, and all the rest [of the ultra-deified sages]—who moreover is consecrated as the most excellent of kings by acts worthy of the poems of the great Rishi VYANACA [or the foodless†], who is renowned for noble exploits to be heard to distant times, and sounded even to heaven ;—

\* So I conjecture from the legend found in the Sri Bhágavat and elsewhere concerning BALARA'MA, the 8th incarnation of VISHNU, having depressed all the eastern part of the earth. But perhaps the epithet may refer to the deities of the destroying elements Water or Fire.

† Perhaps a title of the great VALMIKI, author of the Ramayana, who is said to have fasted ten thousand years unless the terms of the inscription should be thought to require the name of some poet who has sung the exploits of SAMUDRA-GUPTA himself.

25. Of him whose mind is in time of affliction and distress, ever singly intent on the disposition and arrangement of charitable works; who is a god in the mansion of the world; the great grandson of the great king GUPTA, grandson of the great king GHATOTKACHA, son of the great king, the supreme monarch CHANDRA GUPTA;—
26. Of him who is also maternal grandson of LICHAIVI, conceived in the great goddess-like CUMA'RA-DEVI, the great king, the supreme monarch SAMUDRA GUPTA, illustrious for having filled the whole earth with the revenues arising from his universal conquest, [equal] to INDRA chief of the gods;—
27. Of this child of the Sun, though clothed in hairy flesh, this lofty pillar is the *arm*, sustaining all his friends with powerful assistance both at home and in foreign travel; of him, [I say,] whose fame raised by gradual accumulation of materials to the most exalted eminence in the strength of the arm of his liberality, and the abundance of his sentences respecting the law of tranquil meditation, is extended in various directions.
28. And that [fame] purifies the three worlds; even as the [sacred stream given by ARJUNA the hero] of the house of PANDU, [purified the dying] BHISHMA, thus encircled within the noble bandage of the clotted hair of SIVA [whence Ganges first sprung]. Such is the unequalled eulogy, the composition of him who serves the countenance of the great monarch, who by reason of the favour of continually going about in his presence is even infatuated in mind,—
29. The mature\* dwarf—son of the great superintendant of penal justice SRAVA-BHUTI, who is both in peace and war, the counsellor of the young king, the great superintendant [of penal justice] HARI NA'NA. Salvation to [GOD], the kind friend of all creatures.
30. But with whom, however devoted to the study of the Rig Veda, the best gift of the Supreme Sovereign, [can we compare] TILABHATTA, the great superintendant of penal justice, surrounded by his army [of inferior ministers of the law]?

*Remarks on the above Inscription.*

The style of laboured ornament affected in the public inscriptions of India is strongly contrasted with the severe simplicity of the same kind of composition in the monuments of other ancient nations: and the deciphering of the Allahabad pillar does not appear destined to remove in any degree this reproach from the national taste. With the criticism, however, of this inscription, as a literary work, we are little

\* I am by no means satisfied with this rendering of खड्गेरपाकिक but I can find no better. The translation "culinary dwarf" had occurred to me: thus associating to the character of *dwarf* (in Sanscrit खड्गेरक) that attachment to good cheer, which is a standing characteristic of the half buffoon, half counsellor, called Vidúshana in the Indian drama, and considered as a Brahmanical appendage to royalty. But the words scarcely bear out either interpretation:—nor is this association of the characters of dwarf and of *royal attendant* confirmed by any Indian example that I am aware of, however common in the fairy tales of Persia and the West.

concerned : but only with the light that it may help to throw on the history of the people for whom it was written.

Were there any regular chronological history of this part of Northern India, we could hardly fail in the circumstances of this inscription, even if it were without names, to determine the person and the age to which it belongs. We have here a prince who restores the fallen fortunes of a royal race that had been dispossessed and degraded by the kings of a hostile family—who removes this misfortune from himself and his kindred by means of an able guardian or minister, who contrives to raise armies in his cause ; succeeding at last in spite of vigorous warlike opposition, including that of some haughty independent princesses, whose daughters, when vanquished, become the wives of the conqueror—who pushes his conquests on the east to Assam, as well as to Nepal and the more western countries—and performs many other magnificent and liberal exploits, constructing roads and bridges, encouraging commerce, &c. &c.—in all which, allowing fully for oriental flattery and extravagance, we could scarcely expect to find more than one sovereign, to whom the whole would apply. But the inscription gives us the *names* also of the prince and his immediate progenitors: and in accordance with the above-mentioned account, while we find his dethroned ancestors, his grandfather and great-grandfather, designated only by the honorific epithet *Mahá-rája*, which would characterize their royal descent and rights—the king himself (SAMUDRAGUPTA) and his father are distinguished by the title of *Máha-rája Adhirája*, which indicates actual sovereignty. And the last-mentioned circumstance might lead some to conjecture, that the restoration of royalty in the house began with the father, named CHANDRAGUPTA, whose exploits might be supposed to be related in the first part of the inscription to add lustre to those of the son.

Undoubtedly we should be strongly inclined, if it were possible, to identify the king thus named—(though the name is far from being an uncommon one) with a celebrated prince so called, the only one in whom the Puranic and the Greek\* histories meet, the CHANDRAGUPTA or SANDRACOPTUS, to whom SELEUCUS NICATOR sent the able ambassador, from whom STRABO, ARRIAN and others derived the principal part of their information respecting India. This would fix the inscription to an age which its character (disused as it has been in India for much more than a

\* This identity, which after the researches of SCHLEGEL (*Indische Bibliothek*), and WILSON (preface to the *Mudra Raxasa* in the 3rd volume of the *Hindu Theatre*), may be considered as established, has been questioned on very insufficient grounds by Professor HEEREN in the last volume of his admirable *Researches into the Politics, Intercourse, and Trade of the Principal Nations of Antiquity*. The Indian accounts vary as much from each other concerning CHANDRAGUPTA as they do from the classical accounts of SANDRACOPTUS.

thousandycars), might seem to make sufficiently probable,—viz. the third century before the Christian era. And a critic, who chose to maintain this identity, might find abundance of plausible arguments in the inscription: he might imagine he read there the restoration of the asserted genuine line of NANDA in the person of CHANDRAGUPTA, and the destruction of the nine usurpers of his throne: and in what the inscription, line 16, tells of the guardian GIRI-KAHLÁRAKA-SVÁMÍ, he might trace the exploits of CHANDRAGUPTA'S wily Brahman counsellor CHÁNAKYA, so graphically described in the historical play called the *Mudra-Ráxasa*, in levying troops for his master, and counterplotting all the schemes of his adversaries' able minister RÁXASA, until he recovered the throne: nay the assistance of that RÁXASA himself, who from an enemy was turned to a faithful friend, might be supposed to be given *with his name* in line 10 of the inscription. And the discrepancy of all the other names beside these two, viz. of CHANDRAGUPTA'S son, father, grandfather, and guardian minister, to none of whom do the known Puranic histories of that prince assign the several names of the inscription—might be overcome by the expedient usual among historical and chronological theorists in similar cases,—of supposing several different names of the same persons.

But there is a more serious objection to this hypothesis than any arising from the discrepancy of even so many names—and one which I cannot but think fatal to it. In the two great divisions of the Xattriya Rajas of India, the CHANDRAGUPTA of the inscription is distinctly assigned to the Solar race—his son being styled child of the Sun. On the other hand, the celebrated founder of the Maurya dynasty, if reckoned at all among Xattriyas, (being, like the family of the NANDAS, of the inferior caste of Sudras, as the Greek accounts unite with the Puránas in representing him,) would rather find his place among the high-born princes of Magadha whose throne he occupied, who were children of the Moon: and so he is in fact enumerated, together with all the rest who reigned at Pátaliputra or Palibothra, in the royal genealogies of the Hindus. It is not therefore among the descendants or successors of CURU, whether reigning (like those Magadha princes) at Patna, or at Dehli, that we must look for the subject of the Allahabad inscription; but if I mistake not, in a much nearer kingdom, that of Canyácubja or Canouje. This is well known to have been the seat of an extensive empire on the Ganges, founded by a branch of the Solar family, after the decline of Ayodhya or Oude, the ancient capital of RÁMA and his ancestors. And this opinion is confirmed by the coins lately discovered at Canouje, in which we find characters exactly corresponding to those of our inscription—and the same prefix to the king's name on the reverse of the coin, viz. *Mahá-rája Adhirája Srí*. One of these, a gold coin, communicated to me by Mr. J. PRINSEP, and exhi-

bited in the last number Pl. IX. fig. 24, had struck me, before I saw the engraving, as seeming to bear on the obverse the name of GHATOTKACHA, (not, however the father of CHANDRAGUPTA so named on the pillar, from whom the title of *Adhirāja* is withholden, as I before remarked—but a *reigning* prince of the same name and family.) But another gold coin of the same class, in Plate I. fig. 19 of the XVIIth. volume of the *As. Res.* seems to me an undoubted coin of *our* CHANDRAGUPTA\*.

Unfortunately, the catalogues of the children of the Sun, in the Hari-Vansa, the Bhāgavat, and the Vansa-lata, as published by Dr. HAMILTON, are far from being so full and ample as those of the Lunar race, (to which the heroes both of the Mahābhārata and the Sri Bhāgavat belong :) and neither these, nor I believe the Vishnu and Kurma Purānas, extend their lists to the princes of this particular dynasty. From the first formation of this solar royalty at Canouje to its extinction in the person of JAYA CHANDRA, A. D. 1193, I know no authenticated name but that of YASOVARMAN, said in the *Rāja Taranginī* to have been the patron of the dramatist BHAVABHU'TI, and to have been expelled from his kingdom by the Cashmirian conqueror LILITA'DITYA, about A. D. 720:—till we come to the last five, viz. the Rahtore princes, whose names from CHANDRADE'VA to JAYACHANDRA, are known from inscriptions and coins, all in *modern* Devanagari, and posterior by several centuries to our inscription. (A. R. vols. 9, 15, 17). Until further lists be obtained, therefore, the apparent absence† of all date on this part of the column, must preclude any thing like exact determination of the time that elapsed between its hero SAMUDRAGUPTA and YASOVARMAN.

As far as it is possible to form a judgment on internal evidence concerning the age of so short a composition as this, from the enumeration of deities, or the traces of manners that may be discoverable in it, I should be inclined to think that it was written after the hero-worship, which the sacred epics first introduced, had begun decidedly to take place of the simple elementary adoration visible in the ancient hymns of the Védas—yet before it had altogether its present shape, and apparently before the worship of the *linga*, and that of the *sactis*, the most impure parts of an impure system, had begun to attain the footing which they

\* No. 13 bears the cognate name of SASIGUPTA, and Nos. 5, 7, 12, 17, &c. contain names, more or less distinct, of others of the same dynasty.—Mr. PRINSEP, whose attention I called to those coins, thinks also that No. 12, which is in his possession, bears the name of our SAMUDRAGUPTA: and indeed the resemblance is sufficiently striking to authorize the belief.

† Unless indeed the mysterious isolated words at the end, बाङ्गते “on the Arm's bank or shore,” should be thought to inclose a date. According to some numeral rules used amongst Hindu mathematicians, these words *might* denote 22: and this applied to the era of VICRAMA'DITYA, the usual era in those parts, would bring us to B. C. 34. But I need not observe how slippery such a conclusion must be.

had in India at the period of the first Mahometan invasions. While the distinction of works and of spiritual science, as taught in the Upanishads, and pervading all the literature of the Hindus, is alluded to more than once in the inscription;—the Brahmans have that honor as spiritual superiors which we find assigned to them in the Rámáyana and Mahábhárata—not that excessive superiority and extravagant homage which in subsequent ages they claimed from princes: the Brahman here contributes to the honour of the king, not, as in some later inscriptions, the king to the honour of the Brahman. But I cannot forbear from quoting at length the passage of the Mahábhárata to which allusion is made in line 28—proving, that at the date of this inscription, the sacred epic of VYA'SA was regarded and quoted in nearly the same manner as in later ages. The passage is from the 118th canto of the *BHISHMA-parva*, describing that hero's death, surrounded by the chiefs of both the rival branches of the house of CURU: and is as follows:

भोयस्तु वेदनां धार्त्यान्निगृह्य भरतर्षभ ।  
 अभितप्तः शरीरैव निश्चसद्गुरो यथा ॥ १० ॥  
 शराभितप्तकायोऽपि शूलसंपातमूर्च्छितः ।  
 पानीयमिति संप्रेक्ष्य राज्ञस्त्वान् प्रत्यभाषत ॥ ११ ॥  
 ततस्तु क्षत्रिया राजन् समाजङ्गः समन्ततः ।  
 भक्ष्यानुभावचान् राजन् वारिकुम्भांश्च शीतज्ञान् ॥ १२ ॥  
 उपानीतं तु पानीयं दृष्ट्वा शान्तनवोऽब्रवीत् ।  
 नाद्य भोक्तुं मया शक्या भोगाः केचन मानुषाः ॥ १३ ॥  
 अपक्रान्ता मनुष्येभ्यः शरशय्यागतो ह्यहं ।  
 प्रतीक्ष्यमाणस्त्रिष्ठामि निवृत्तिं शशिमूर्त्ययोः ॥ १४ ॥  
 एवमुक्त्वा शान्तनवो निन्दन् वाक्येन पार्थिवान् ।  
 अर्जुनं द्रष्टुमिच्छामि इत्यभाषत भारत ॥ १५ ॥  
 अथापेत्य महाबाहुरभिवाद्य पितामहं ।  
 अतिष्ठत् प्राङ्गलिः प्रह्वः किं करोमीति चाब्रवीत् ॥ १६ ॥  
 तं दृष्ट्वा पाण्डवं राजन्नभिवाद्यायतः स्थितं ।  
 अभ्यभाषत धर्माज्ञा भोयः प्रीतो धनञ्जयं ॥ १७ ॥  
 दक्षतीव शरीरं मे संवृत्तस्य तवेषुभिः ।  
 मर्माणि परिहृत्यन्ते नुखं च परिगुप्यति ॥ १८ ॥  
 वेदनार्त्तशरीरस्य प्रयच्छाम्भो समार्जुन ।  
 त्वं हि शक्नोः महेष्वास दातुमभो यथाविधि ॥ १९ ॥  
 अर्जुनसु तथेत्युक्त्वा रथमारुह्य वीर्यवान् ।  
 अघ्नित्त्वं बलवत्कृत्वा गाण्डीवं व्यासिपद्भुः ॥ २० ॥  
 तस्य ज्ञातलनिघापं विस्फूर्जितमिवाशनेः ।  
 विवस्वतः सर्वभूतानि सव युला च पार्थिवाः ॥ २१ ॥  
 ततः प्रदक्षिणं कृत्वा रथेन रथिनां वरः ।  
 शयानं भरतश्रेष्ठं सर्वशस्त्रभृतां वरं ॥ २२ ॥

सन्धाय च शरं दीप्तमभिमन्य स पाण्डवः ।  
 पार्जन्यास्त्रेण संयोज्य सर्वज्ञोकस्य पश्यतः ॥ २३ ॥  
 अविभक्तं प्रथिवीं पार्थः पाञ्च भीष्मस्य दक्षिणे ।  
 उत्पपात ततो धारा वारिणे विमन्ता शुभा ॥ २४ ॥  
 शीतस्नान्तकल्पस्य दिव्यगन्धरसस्य च ।  
 अतर्पयन्ततः पार्थः शीतया जनधारया ॥ २५ ॥  
 भीष्मं कुरुणामृषभं दिव्यकर्मपराक्रमं ।  
 कर्मणा तेन पार्थस्य शक्तस्त्वेव विकुर्वन्तः ॥ २६ ॥  
 विस्मयं परमं जग्मुस्ततस्ते वसुधाधिपाः ।  
 ततकर्म प्रेक्ष्य बीभत्समतिमानुषविक्रमं ॥ २७ ॥

But BHI'SHMA, O chief of the Bháratas, with firmness suppressing the sense of pain, while burning with the arrows that pierced him, and breathing hardly like a serpent—nor only with body inflamed, but with mind also maddened with the wounds of those sharp weapons, exclaimed only "Water!" when he saw the princes approaching. Then, O king, did those Xattriyas collect immediately from every quarter food of various kinds, and goblets of cold water: upon seeing which the son of SANTANU sadly exclaimed, "Not now can such ordinary human pleasures be tasted by me: for now cut off from mankind, I am stretched upon my arrowy\* bed, and lie expecting the hour when the sun and moon shall be closed to me." But having spoken thus, O BHARATA! chiding by his words the assembled chiefs, the son of SANTANU added, "I would see ARJUNA." Upon which, he of the mighty arm approaching with salutation his grand-uncle, and standing with hands joined and body bent forward, said, "What shall I do?" And the pious BHISHMA, with pleasure beholding the great Pándava chief standing before him, answered, "My body burns, covered as I am with thy arrows, my vitals are racked, my mouth is dry: bring some water, ARJUNA, to my tortured frame, for thou of the great bow art able to give me such streams as I require." The brave ARJUNA thus addressed, having mounted his car, and fitted his bow-string, bent his strong bow called Gandiva, for the intended shot: and on hearing the twang of that bow-string, a sound as if bursting from the thunder-bolt of INDRA—all creatures trembled, even all those chiefs themselves. Then he, the best of charioteers, having wheeled his car in a reverential circle round BHISHMA on his right, the prostrate son of BHARATA, best of all hurlers of weapons—and having taken a flaming arrow, and breathed a magical sentence (*mantra*) over it, and fitted it to his bow—the whole world looking on—did with that dart of thunder pierce the whole earth close on the right side of BHISHMA—and thence sprung up a pure beauteous stream of cold water, like the nectar of the immortals, of divine scent and flavour: and with this cold stream did he powerfully refresh BHISHMA, prince of the CURUS, of god-like works and prowess. With this work of the prince ARJUNA, as of a mighty transforming magician, the lords of the earth were seized with extreme astonishment, beholding it as a deed equally compassionate and transcending all human power.

\* The *sara-sayyá*, or arrowy bed, was assumed as a voluntary penance in imitation of BHISHMA by a singular devotee, who was living at Benares in the year 1792, a curious account of whose travels and adventures, together with a portrait of him stretched on his pointed bed, was given by Mr. JONATHAN DUNCAN in the 5th volume of the Society's Transactions. [In that account, p. 5, *Bhikma Pitámaha*, is merely the Hindui mode (ख for च) of writing "BHISHMA the *grandsire*," or rather *grand-uncle* of the contending chiefs of the houses of DHITARASHTRA and PANDU.



अक्ष्णोर्ध्वनेत

मयाक्रान्ते सर्गवातसखमनसः शास्त्रतरार्थ्य भद्रे ल(कणि) स्तब्धो नि(मातापि वर्षा इव \*)

(भ)तैयश्रीवित्को धान्धगुणितगुण खेइं तानेव छत्वा खर्लैके वेधसुरे बज्जकविताकीर्तिराज्यं भुनक्तु

(प)द्यार्हाः १ ल्युपगुणभावपिशुनैरुक्वर्षानरेमभिः सभ्ये सूर्द्धसिते सङ्गुस्यकुलजमाननद्ये

खेह्यभिहितेन बाचाटगुरुणा तत्तच्छिणा चक्षसा यः पत्राभिहितो निविष्टनिखि(चरवः)

स्वकर्मस्योऽनकान्यमानुजसदृशान्याहृतोद्भिन्नहर्षभूवैराखदधाम

वोर्व्योत्तमश्चक्रवद्धरणमपगतं यस्य वृत्ते प्रणामे ऽप्यरि(मणानां)

सङ्गामासिखभुजविजिता नित्यमुच्चापकाराः श्वश्वो मानप्रमदमनसो यस्य संहारिकायाः)

तोक्रोक्तुङ्गैः स्फुटबज्जरसखेहफुल्लैर्मनोभिः पश्यात्तापाव(नतहृदयाः सर्वदातो बभूवः)

(म)रिहेलोदितबाहुवीर्यं राक्षसादिके नायिनि क्षणजिन्मृत्युच्युतनगे सच

दृष्टैर्महयागैर्वैकोतकलजपुष्पचार्यं क्रीडापाद(पवने ऽपूजयन्)

वङ्गार्द्रवीरबन्धाः शशिकरगुचयः कीर्त्तयः सांप्रतं न वै क्षयात्(उ)क्तप्रगाघ(मुक्ति)रु(त्वन्ना)

सप्तमार्गः कविमतिविभोत्तराणं चापकायको नास्त्राजरदानस्य

वैधसाधारशतावतरणदत्तस्य स्वभुजबलपराक्रमारिबन्ध(ननिपुणस्य बेरिसेनाविघातशानित)प्रासासितोमर(भारिणः)

यस्यपलनाराचवैतस्त्रिकायनेकप्रहरणविरूढकुलत्रणशताङ्गभुनामोदयपठितकान्तरचक्षुण्णयकविघागाववमुक्तिकस्य

कासरकमहेन्द्रमहाकान्तारकयाधराजकराक्षतमण्डराजात्मसुपारकमहेन्द्रगिरिकङ्कारकस्वामिदत्तारणपत्तिकादिसैनिकसानुगहृजनिप्रतिपन्मिश्रयादुर्भाग्यस्य

नीलराजवद्रायकहस्तिवर्मपालकार्केयसेनदेवराष्ट्रककुवेरकस्थलपारकधनञ्जयप्रभृतिसर्वदत्तियुष्वराजग्रहणमतेः परिचारकैस्तत्सर्वदेवैकराजस्य

रुद्रदेवमत्तिलनागदत्तचन्द्रवक्रिगणपतिवृगनागसेनाच्युतनन्दिबलवाह्यायनुकार्थ्यवृत्तेराजप्रसवेऽदरयोद्भूतप्ररेचसंहारिकादिभिश्च सर्वकुरदानार्द्रकरणप्रणमगमना(हतस्य)

सुमतदारुचक्रकामरूपनेपालकीर्त्यपरादिप्रत्यन्तप्रतिभक्त्तवर्धनयनार्थ्यधेयमद्रिकाभोरज्जानुसैनिकानोकोत्यकविरिपुहनसहेष्काराख्येः संहारिकादिभिश्च

अपरिणामितप्रचण्डशासनस्य सैनिकधराज्योत्पन्नराजवृत्तप्रतिष्ठापनाहृतनिवैभ(वदा)न(निषिञ्जग)णगन्तृयशसः दवपत्रवृद्धिसरोधरणिबन्धस्य एषियामप्रतिरघस्य

सर्व्वेदीपवासिभिरात्मनि वदनकायोदयनदगरुमद्दृष्टविनेयमुक्तिशासनधनायुदयसवक्रतुबज्जधैर्यपावनतिमात्रयास्यदुहृदयस्य १ कर्मवतो नाकभूशतसहस्रप्रदायिनः(१)

सद्गीतशताङ्गुतानेकगुणगणान्कभिन्नरणतलप्रमृष्टान्यनरप्रतिकोर्त्तः साङ्गसानुदयत्कलहस्य दुःखापहासहेल्यस्य भक्तसमस्य स्वभुजाहुविजितानेकनरपतिविभवप्रत्यक्पणनित्ययापारेत्कोपदमस्य

(गु)ण्योदनाथात्मराजनङ्गरासन्नदोर्घाभ्युपमानमद्रस्य विग्रहावताटकनागहस्य धनदवरुणेन्द्रान्तोक्तप्रतिष्ठितकविराजश्रेष्ठस्य सुचिरश्रोतयनाकङ्गतोदारचरित्रस्य

निश्चितविदयमतिकगाम्भ्वलोहितोर्वीरिपुत्रिदशपतिगुरुतुम्बुरुनारदादेव्विद्वज्जन(व)रविद्यन्नककाव्यक्रियाभिः प्रतिष्ठितराजश्रेष्ठस्य सुचिरश्रोतयनाकङ्गतोदारचरित्रस्य

क्लान्तसमर्थक्रियानुविधानमात्रमानसस्य लोकधासि देवस्य महाराजश्रीगुप्तप्रपौत्रस्य महाराजश्रीघटोत्कचपौत्रस्य महाराजाधिराजश्रीचन्द्रगुप्तपुत्रस्य

लिच्छविदोहित्रस्य महादेयां कुमारदेवामृत्युत्रस्य महाराजाधिराजश्रीसमुद्रगुप्तस्य सर्व्वेष्टधिवीजियजनितादययाप्रनिखिलावनितककोर्त्तिसतस्त्रिदशपति(तुल्यस्य)

भवनगमनविपुलहितसखविधरत्रोमचर्मणः रविभूवो बाज्जरयमुच्छ्रितः स्रमः यस्य प्रदानभुजविक्रमप्रशमशास्त्रवाक्योदय उपर्युपरिसहयोच्छ्रितमनेकमार्गं यशः

पुनाति भुवनत्रयं पशुपतेर्जटान्तर्भद्रनरोधपरिणद्धभीष्मिव पाण्डुगृह(पाथेदत्तवार्ये)व तच्च कायमसमं च भङ्गारकवदनदासस्य समीपपरिसर्पयानुगह्योन्मोहितमतेः

खड्गेरपाकिकस्य महादण्डनायकश्रवभूतिपुत्रस्य सन्धिविगृहिककुमारामात्यस्य म(हादण्डनाय)कहरिनायस्य सर्व्वभूतहितसखायास्तु (नमः)

सेनान्वितं च परमभट्टारकप्रदानगर्गतेन महादण्डनायकतिलभङ्गं केना(परं करिष्यामः)

बाहुतटे

\* The words in smaller type, and between brackets, are interpolated to fill the vacant spaces, where the inscription is effaced. (See page 259.)

This part of the inscription is peeled off from the stone.



II.—*Journal of a Tour through Georgia, Persia, and Mesopotamia.* By Capt. Mignan, *Bombay European Regiment, Fellow of the Linnæan Society of London, and M. R. A. S.*

At the commencement of the year 1830, after travelling over a large portion of the Russian dominions, I reached the capital of Georgia; with an intention of prosecuting my journey through those provinces of Persia, which have not been visited by Europeans for many years. With this view I took advantage of the departure of the Persian Prince KHOSROU MIRZA, with whom I had been for some time associated, and who was now with a numerous suite on his return to his native country, from the court of St. Petersburg, where he had been deputed by his own Government, to explain the causes which led to the massacre of M. GRIBOJEDOFF, the Russian ambassador, and his whole retinue. This melancholy occurrence took place at Telhran, the capital of the Persian kingdom, in February, 1829.

KHOSROU MIRZA is the fifth son of His Royal Highness ABBAS MIRZA, the heir-apparent to the Persian throne, by a Khoi woman of inferior rank and family. He is about three and twenty years of age, of middle stature, and like the majority of Persians, possesses great *politesse*, and much *naïveté* in conversation.

On the 31st of January, we left the sublime chain of "Frosty Caucasus" in the rear, covered with perpetual snows, and following the course of the river Koor (the Cyrus of the ancients), in a south-easterly direction, entered at once upon the plains of the ancient Iberia, which lays stretching before us, till lost in the blue haze of distance, and presenting to the eye a most uninteresting and even depressing effect. At this season it was peculiarly so, every passing cloud sprinkled flakes of snow on our track, and threatened a heavy fall. Our road passed through a succession of low hills of a gravelly soil, lightly mixed with earth, though sufficiently fertile when water for the purposes of irrigation can be procured. On the bank of the river, at a short distance from the village of Saganlook, our proposed quarters, we observed some time-worn memorials of the extinct dynasty of the last Georgian kings. Of these, the remains of an old fortress, on the nearest heights, and near it two as ancient towers, with the remains of a bridge, were not the least conspicuous objects. This village, which is about ten miles from Tiflis, was the place marked out for the termination of our first day's march, and the houses were so small and wretched, as to be scarcely discernible from the inequalities of the ground. Their description corresponds precisely with those mentioned by XENOPHON in the Anabasis, or expedition of CYRUS into Persia. In book IV. chap. v. he says,

“ Their dwellings were underground, the mouth resembling that of a well, but spacious below; there was an entrance dug for the cattle, but the inhabitants descended by ladders. In these houses were goats, sheep, cows, and fowls, with their young.” Throughout Georgia the inhabitants make an excavation in the ground, and then build up the sides with large stones. Upon this they lay rafters, and cover the whole with earth, so that in walking through a village, it is very difficult to tell whether you are upon a house-top or on the bare ground. An aperture is left at the top to light the room inhabited by the family, who are only divided from the cattle by a thin planked partition.

To the traveller indeed, nothing very enlivening presents itself; the roofless remains of hamlets that have been destroyed by the tyranny of rulers frequently occur, and old burying places which mark the spots where man *once* has been. Every thing, in short, indicates that the Government is a bitter enemy to the prosperity of the people.

At Saganlook, the range of mountains made an acute angle, direct south; and thence continued stretching along the acclivities which formed an alpine wall to our road. On quitting the village we bade adieu to the often travelled Erivan road, and some crumbling towers; and descended a narrow ravine into a valley bounded by an inconsiderable but romantically situated lake. The hills on our right presented the habitations of the peasantry; who appeared poor and wretched. On leaving the valley, an abrupt ascent brought us to an open tract of country. The plain to the southward of our route was bounded by a flat horizon, from which every successive mountain rose, as we advanced, like objects when first seen at sea; while to the eastward of our direction, the turbid river Cyrus playfully meandered through a fine though uncultivated soil, until it was lost in the capricious stratification of the inhospitable looking mountains.

This part of Georgia is now called Kartalinia, and was the ancient Iberia. PTOLEMY describes it as bordered on the north by the Sarmatian mountains; to the south by a part of Armenia; to the east by Albania, and to the west by Colchis. Many of its towns and villages are mentioned by him, and also by STRABO, who travelled through this country, and who speaks of its being a luxurious and flourishing state. A distressing contrast it now presents! An independent kingdom, reduced to the abject situation of a province; and not immediately to the sovereign power itself, which might dispense consequence with near union; but through the double vassalage of a medium, being an appendage to another subject province—that of Georgia. Invasions from rival neighbours swept off the brave population of this little kingdom; and the final blow was struck by those who possessed ambition, without the manliness to maintain it themselves. Like other powers who have

Fig 1

Errors in Maps from bad Spelling  
(page 284)

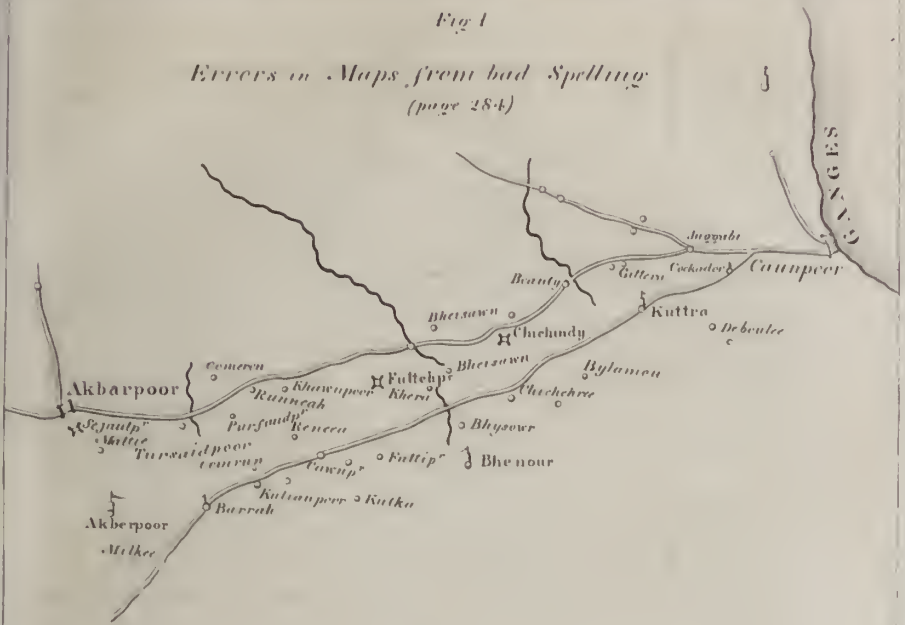


Fig 2

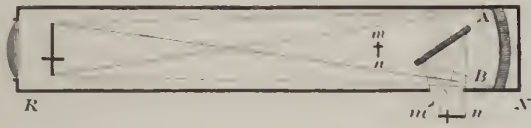


Fig 3

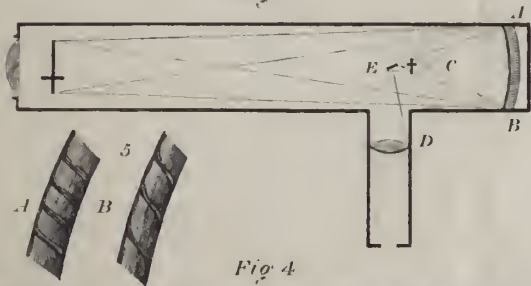
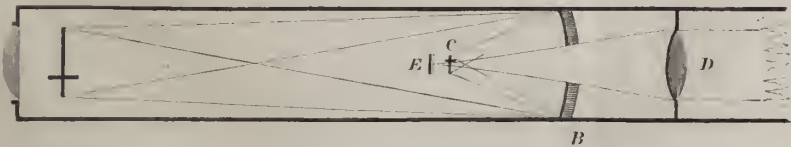


Fig 4





present attempt to supersede. For this purpose, I select the microscope invented by Professor AMICI of Modena, as justly deemed the most refined and perfect now in use. The optical principle of this instrument is represented in fig. 2, Pl. XIX, and is thus described in Dr. BREWSTER's elegant treatise upon optics: "He (professor AMICI) made use of a concave ellipsoidal reflector, whose focal distance was  $2\frac{4}{5}$  inches. The image is formed in the other focus of the ellipse, and this image is magnified by a single or double eye-piece, eight inches from the reflector. *As it is impracticable to illuminate the object, m n, when situate as in the figure*, professor AMICI placed it without the tube or below the line RN, and introduced it into the speculum A B by reflection from a small plane speculum placed between *m n* and A B, and having its diameter about half that of A B." I have marked the requisite position of the object *m n* to facilitate the reader's conception.

The reader will note that there are two reflections in the objective part of this instrument; one of which is useful only as introducing the rays proceeding from the object, and contributes in no respect to the magnifying virtue of the microscope. He cannot fail to observe also, that the great size of the plane forms a very serious impediment to the rays of light proceeding from the concave metal to the eye-glass. By an improvement of Dr. GORING's, the size of the plane has indeed been reduced to  $\frac{1}{3}$ rd the diameter of the great mirror. But even in this improved state it continues so material an obstacle, besides having other and greater disadvantages to be touched upon in the sequel, that one cannot avoid wishing it removed if possible, by introducing and illuminating the object itself in the axis of the tube at the focus of the concave speculum. This improvement I have endeavoured to effect by a very simple optical contrivance, which will be easily understood by reference to figure 3, representing the form of the instrument adapted for diaphanous objects. A B is the concave ellipsoid or mirror, and C is a transparent object situated directly in its focus: D and E are the illuminating apparatus; D being a bull's-eye lens, and E a *very small* plane diagonal mirror, so situated as to reflect parallel with the axis of the tube rays of light coming from the lens. By this arrangement, an image of the luminous aperture F, is formed in the focus of the lens and just behind the transparent body C. It is now apparent that but one reflection is sufficient to form an image of a microscopic body in the conjugate focus of the speculum; and that the diagonal plane being of almost evanescent dimensions, presents no obstacle worth mentioning to the rays in their passage to the eye-glass.

The mere loss of light however, attendant upon the Amician construction, is a disadvantage of very secondary importance; for it is obvious

that almost any amount of loss may be compensated by an artificial condensation of light upon the object under examination. But the disadvantages of a double reflection are of a higher and more important order. It is one of the most inflexible laws of practical optics, that all superfluous refractions or reflections are to be avoided, and for this simple reason, that to form a perfect surface, either plane or spherical, or of any other figure, is beyond the power of human art, however exquisite, and hence the greater the number of reflections or refractions, the more darkened and muddy will the vision become. When we consider therefore, how extremely minute are many objects of microscopic investigation (such for instance as the marks, probably not the 10,000th of an inch in diameter, upon the dust of lepidopterous insects), we may conceive how much vision may be impaired by a very slight error in the figure of the plane, augmented in the long passage of the rays from the mirror to the eye-lens. It is well known that NEWTON'S objections to the Cassigramian and Gregorian telescopes arose from considerations of this kind. "The errors (says he) of the said convex will be much augmented by the too great distance through which the rays reflected from it must pass before their arrival at the eye-glass. For which reason I find it convenient to make the tube no wider than is necessary, that the eye-glass be placed as *near to the oval planes as possible*, &c." If we conceive his own form of the instrument subjected to reversed vision, it will bear no remote resemblance to the Amician microscope; and tried in this way, I am pretty confident we should find a material difference in the performance of the most exquisite reflector. I took a one-foot Newtonian, having a very indifferent plane, but which showed objects in the day time sufficiently well; and making the rays from the object enter by the small metal, I looked with a lens directly in front, throwing the image a little out of the axis so as to escape the plane. Allowing for the necessary deficiency of light, the image was so confused and distorted, that it was almost impossible to distinguish any object whatever.

As there is some analogy between the telescopic "front view" of **HERSCHELL** (*magnis componere parva!*) and the microscope I propose, it may not be amiss to remind the reader of the advantage that great optician found in laying aside the oval plane. Besides the "capital advantage of nearly double the light of former constructions," the defining power seems also to be increased. "The 20ft. reflector having been changed from the Newtonian form to my present one, I had a very striking instance of the great advantage of the increased penetrating power in the discovery of the Georgian satellites. The improvement, by laying aside the small mirror, was as 61 to 75, and whereas



the former was not sufficient to reach these faint objects, the latter showed them perfectly well."

But to return to our humble sphere; the advantages of the new construction may be very briefly summed up. First, increased brilliancy and penetrating power, arising from the removal of the plane. Secondly, the probability of obtaining finer instruments; for the artist having the difficulties of but a single reflecting surface to contend with, manifestly enjoys at least a double chance of producing a perfect work.

Of the method of observing with this instrument, I think it hardly necessary to speak. The object must be inserted into the tube, affixed either upon a very small plate of talc, or upon the point of a fine needle; and adjusted to the focus with a delicate screw. This is a very simple affair in the hands of a skilful mechanic. For observing large objects with low powers, a speculum of long focus, say  $1\frac{1}{2}$  or 2 inches, is obviously the best; but for more minute investigations a deeper one is desirable. With the requisite arrangements, such an instrument would, I conceive, be hardly if at all more difficult to use than a refractor.

I have wrought several metals upon this plan, and though I enjoy no opportunity of having them fitted up otherwise than in the rudest and most imperfect manner, I find their performance upon some minute and rather difficult objects very satisfactory. With a metal of about six inches focus and three aperture, without any attempt at adjustment, or any convenience for arranging the focus, several test objects have been easily developed, such as the asperities on the surface of the human hair, the striae upon the dust of lepidopterous tribes, &c. Fig. 5. represents the hair of the mouse, like a picce of well twisted whipcord, with longitudinal marks between the spirals, considered by microscopists as a good test. (Dr. GORING in the Quart. Journal, June 1827.) A represents the hair near the root, B near the extremity.

When I first applied myself to these constructions, I was apprehensive that the introduction of light would produce a glare in the tube detrimental to vision. But I find this not at all the case. The main tube however, should be made considerably larger than the diameter of the mirror, and a well blackened diaphragm may be placed on each side the illuminating apparatus to quench any stragglng light that may intrude. The size of the diagonal plane in the above instrument is about .05, in shorter diameter. and is I find a great deal too large. One of only .025 would be sufficient, I think. I had almost omitted to mention, that as many objects require a somewhat oblique radiance to be even seen, this may be obtained by giving the diagonal a slight revolution on its shorter axis; or perhaps as simply by closing up one half of the bull's-eye lens.

Having now so fully described the microscope for viewing transparent objects, I shall very briefly notice that intended for opaque ones. It is represented in fig. 4, where A B is the great mirror, perforated in the centre for the purpose of admitting a conc of light proceeding from the lens D, and forming an image of a luminous aperture (not represented in the figure for want of space) just in front of the microscopic object C, situated in the focus of the metal. The attempt to construct this instrument was at first attended with a great deal of trouble, my original intention being to introduce a parallel beam of light, condensed by a combination of lenses, through a *very small* hole pierced in the centre of the metal. But for want of proper mechanical assistance the attempt proved abortive. I accordingly altered the plan, and enlarged the aperture to about 0.2, as in the figure, and admitted light through a bull's-eye. E, is a stop, to arrest the rays that would otherwise pass out to the eye-glass. It may be coloured according to the ground that is best adapted for displaying the object under observation.

After enlarging so fully upon the former instrument, it is not necessary to enter into much detail regarding the present one. All the observations upon the optical principle of the one apply with equal force to that of the other. I regret, however, that I had not an opportunity of ascertaining as satisfactorily by experiment the performance of this instrument, the perforated metal having been accidentally shattered to fragments by a fall. Some trials however, upon ordinary objects in its incomplete state, convinced me that this construction would perform well. It exhibited the brilliant scales of a *curculio* in a very pleasing manner. If upon the back of the stop E, a small silver cup be fixed so as to be turned round occasionally, it will enable us to vary the light by which objects are viewed; and to examine them at once by radiated and transmitted rays.

Nothing I conceive can be more simple than the optical principle of these instruments; a single reflection, and a single refraction. And what on the other hand can be more complex than achromatic refractors with their triple, quadruple, quintuple, sextuple, and even triple-triple object glasses? As any ordinary reflector may be very simply converted into one upon the new construction for diaphanous objects, by merely substituting a small diagonal metal for the Amician plane, I am not without hopes that some naturalist in possession of a standard instrument will do me the honour of giving the new principle a fair trial. The result with an object metal wrought by a good artist will be decisive.

I have already extended this notice too far to enable me by this opportunity to communicate some speculations I intended upon several

new and curious achromatic combinations I have tried. I shall possibly do myself the honour of submitting them upon a future occasion ; mean while, nothing I trust has escaped me in the foregoing observations that can be construed into a disrespectful mention of the Amician reflection. Far from me be the impertinence of disparaging an instrument which the highest optical authorities have concurred to applaud. I have merely ventured to inquire whether that instrument, superior as it is, has yet attained the maximum of excellence.

V.—*Notes relative to the collection of some Geological Specimens in the Kásia Hills between Assam and Nunklow. By W. Cracroft, Esq. C. S.*

On my journey from Chira Poonjee to Assam, I endeavoured to recognize the ascents and descents, and the geological features of the country, as laid down in Captain FISHER'S Sketch, but I found this impracticable, excepting at those mountains of which he observed the altitudes. I was therefore led to imagine that the intervals between the points given in his sketch had been filled in at random, and that the general geological characters of only the observed points were noted.

On my return, I endeavoured to obtain a nearer approximation to the real outline of the road, and the positions of the various rocks, and I accordingly made the following notes of the time occupied in travelling, both in ascending and descending, the different hills, sketching their profile at the same time on the opposite page of my memorandum book, and noting the times and places at which the geological specimens already forwarded to you were collected. The heights of Jyrong and other points I have taken from Captain FISHER, whose barometrical observations have been found to correspond very closely with others since made. Allowance has been made in the outline for the difference of time in ascending and descending. (See Pl. XX.)

*First day, from 8h. 48m. ; commencement of ascent to Jyrong.*

I began to ascend at viii. 48, through a narrow defile ; the rock is apparently a fine grained granite, containing beds of A 2 (a conglomerate of iron clay) : at viii. 50, reached the bottom of the first descent, (which was a granite similar to No. 1, but rather whiter and less decomposed) : by xi. 7, I reached the next summit, the ascent yielding the granites, A. 4, 5, 6, and 7, and decomposing felspar: the road was then comparatively level till viii. 37, when the ascent became steeper and the rock all along was A. 8, (granite) ; but at 37 minutes containing large scales of mica (A. 9.)

The descent, after ix. 40, was at first very steep, with precipices at the road side : afterwards less steep ; A. 10 and 11 mica and gneiss being in

situ with red clay: the stream, passed at x. 57, runs over gneiss rock: at xi. 50, began to descend, and after passing a small stream, running over rock A 12, arrived at Jyrong at 12 o'clock; the rock at Jyrong is A 13. The whole of this day's march was through a well wooded country. The gibbon or long-armed ape inhabits the forest near Jyrong, and its hootings echo through the forest; wild elephants are occasionally seen and leopards.

*Second day, from Jyrong to Ongswye and Mopea.*

The road continues through the forest, principally along the course of mountain torrents till vii. 33. where there is a level, capable of cultivation, and formerly was a stockade; it is however a swampy place, and certainly not a good situation for a stage-house. If a stockade were erected at the top of the hill, which we reached at viii. 56., it would divide the journey from Mopea to Ranegang very equally, and much better than either Jyrong or Ongswye, the latter of which is situated in a hollow surrounded by a swamp. The decomposing felspar found at I. 25., and other places seems likely to afford porcelain. A small chestnut not much larger than a fine marrow-fat pea grows here; also a few beech trees,

*Third day, from Mopea to Nunklow.*

The view from Mopea is I think more beautiful than any on the road between Assam and that place.

Between Mopea and the Burpanee there is no jungle, the neighbouring hills have many fir trees. The water-fall at the Burpanee surpasses in beauty any I have seen; it has not indeed the advantage of falling from a great height, but the body of water is very large: I descended with some difficulty to the rocks at the bottom of the fall, which seems not to be more than 80 or 90 feet, and is broken in several places; the black rocks, through which it has cut its passage, rise considerably higher than the stream, and overhang the basin at the bottom of the fall: they are well covered with wood. The basin extends to a great distance, beyond which a turn of the river seems to inclose it, and gives it the appearance of a spacious lake. It is altogether truly sublime and beautiful. Between this river and the small stream at the bottom of the great ascent, the road winds through a forest of enormous fir trees; the mountain seems perfectly to overhang the road wherever you get a glimpse of it through the trees, and almost discourages the traveller from attempting the ascent, which occupies more than two hours.

An accident which befell me at Nunklow prevented the continuance of these remarks, but I collected a few specimens mentioned in the list, and made the following observations in the neighbourhood of the Bogapanee and Kalapanee rivers.

At Mouflong the rock is white flinty slate, the joints or strata being nearly in the direction of the meridian and inclined to the horizon at an angle of about  $60^\circ$ ; this rock continues all the way down to the bed of Bogapanee river, which is covered with rolled masses of granite, gneiss, porphyry, and sandstone: wherever the rock bassets, it is red slate (E 2), at the same angle and in the same direction as the white at Mouflong; immediately upon this lies a stratum of the conglomerate (E 3), containing pebbles of quartz and jasper with a talcose cement, of which large masses have fallen into the bed of the stream; it may be traced to the bed of the next nullah, where it also appears in sight; the stratum above this is a dark sandstone, E 4, upon which is a stratum of basalt, or porphyry, F 5, the outside of which becomes red by decomposition. Above this are new sandstones of various hardness and colours (mostly white), alternating with conglomerate (E 6), which continue as far as the valley of the Kalapance, in descending into which the same strata are visible in the perpendicular face of the rock, and in the large masses which have fallen over; E 7 (conglomerate) is picked out of a stream: about 80 feet above the stream, the same porphyry or greenstone basalt again appears, E 8, with veins of fine quartz E. 9. This rock forms the bed of the river, and continues till we begin to ascend on the opposite side of the valley (I saw one mass evidently columnar, the faces with angles of  $120^\circ$ ). In the ascent we return to the sandstone, and conglomerate, in which I found a bed of lithomarge, E 10, and a bed of quartz conglomerate, containing crystals of amythystine quartz.

After reaching the summit on the road to the left leading to Mo-leem (at about 100 yards distance) is a bed of bituminous slate, E 12; from hence to Chira we meet only varieties of sandstone, with beds of stalactitic iron ore, (No. 13), and of coal adjoining pipe-clay E 14, 15, which are found about a mile and a half south of Sura-reem.

*Catalogue of Specimens, deposited in the As. Soc. Museum.*

*Ascent to Jyrong. Specimens marked A.*

1. Fine grained granite, glassy and angular.
2. Conglomerate of iron ore with pebbles in beds in the above.
3. Granite resembling 1.
4. Do. apparently quartz in fine grains stratified with decomposing felspar, being No. 1, in a state of decomposition; but the rock No. 1, is regularly crystalline, its angles and joints perfectly defined.
- 5, 6. Fine grained red granite. (with minute crystals of hornblende?)
7. Decomposing felspar with quartz in irregular fragments.
8. Fine grained red granite.
9. Gneiss (granite stratified with plates of mica).
- 9½. Conglomerate; iron ore and pebble found in a watercourse.
10. Decomposed gneiss,—purple.
11. Decomposing felspar with quartz in very small particles.

- 11½ Quartz passing into gneiss; apparently a vein in the gneiss.  
 12. Fine grained granite, the mica in larger masses than the felspar and quartz.  
 13. Fine grained white granite (containing hornblende).

*Between Jyrong and Mopea, (marked B.)*

1. Black gneiss containing much hornblende.  
 2, 3. Granite, fine grained, with much black mica.  
 4. Quartz and mica (not in situ) white in great quantity, with red clay.  
 5. Quartz, in situ, white.  
 6. Decomposing felspar containing small crystals of quartz.  
 7. Fine grained granite, white, containing minute crystals (of hornblende)?  
 8, 9. Do. do. red.  
 10. Mica stratified with decomposing felspar, (query gneiss?)  
 11. Gneiss with much mica.  
 12. Do. less mica, much felspar, decomposing.  
 13. Granite with much mica.  
 13½. Almost all mica (gneiss?)  
 14. Gneiss with much mica.  
 15. Granite with black mica.  
 16, 17. Gneiss. 18. Granite, grey.  
 19. Decomposing felspar with quartz, fit for porcelain.

*Between Mopea and Nunklow, (marked C.)*

- 1, 2, 3, 4, 5, 6. Granite, reddish and grey varieties—approaching sandstone.  
 7. A micaceous schist with red felspar.  
 9. Crystals of felspar decomposed, but retaining their form.  
 10. Mica stratified with decomposed felspar.  
 11. Mica in hexagonal plates.  
 12. Quartz tinged with mica.  
 13. Micaceous, with crystals radiating from a point (approaching actinolite?)  
 14. Red quartz (approaching hornstone) with mica.  
 15. Granite (the felspar decomposed).  
 16, 17. Quartz with mica in veins.

*Specimens, none of them in situ, found on the ascent immediately below Nunklow.*

*C-a.* White and black zeolitic porphyry?

*C b, c, and d.* Micaceous schist.

*C e.* Decomposed ditto, ferruginous.

*C f.* Ditto white, in laminæ.

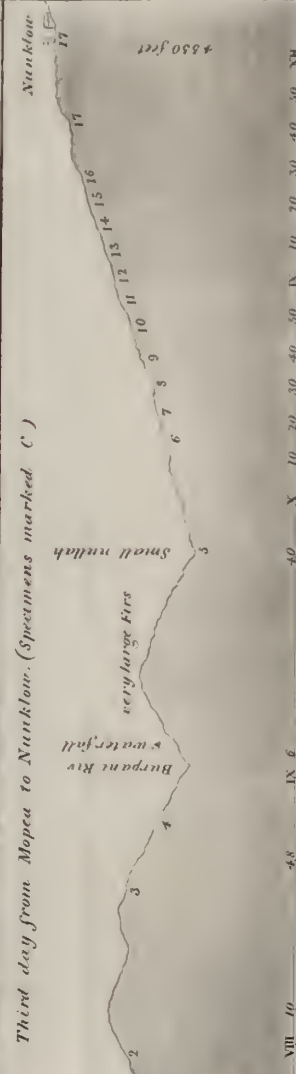
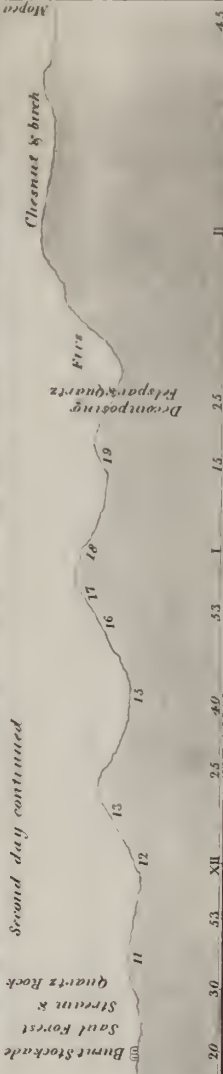
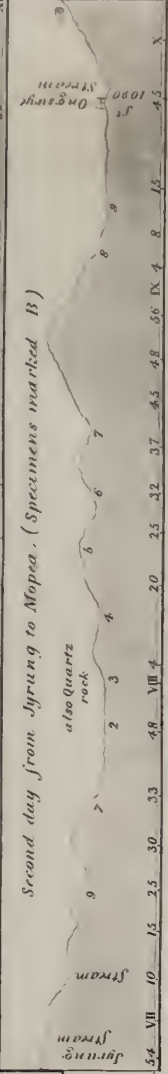
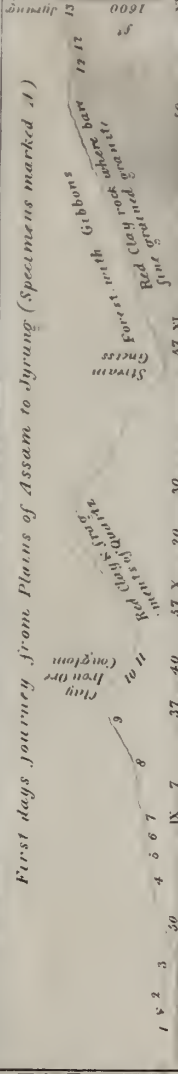
*C g.* Quartz with black mica: and fine specimens of green actinolite.

*Collected between Myrong and Moufong, marked D.*

1. Near Ly,yung, clay slate.  
 2. Lithomarge.  
 3. Slate, a small hill between the valley of Kiug-lung-tung and Moufong.

*Between Moufong and Surareem, marked E.*

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| 1. White sandstone.                | 8. Greenstone.                       |
| 2. Red ditto ditto.                | 9, and 8. Fat quartz veins in No. 8. |
| 3. Brescia.                        | 10. Lithomarge.                      |
| 4. Dark red sandstone (query old)? | 11. Coarse quartz sandstone.         |
| 5. Basalt, conchoidal lumps.       | 12. Bituminous shale.                |
| 6. Sand stone, new.                | 13. Stalactitic iron ore.            |
| 7. Clay slate.                     | 14, 15. Coal.                        |



Mueylong  
Batsapani R  
Khatu  
Syring  
Mopea  
Nunklow  
Ongang

*Plan of the Strata & Beds in the vicinity of the Batsapani & Khatu Rivers & Khatu Hills*

*The numbers on the outline of the Hills refer to the Specimens collected each day*

Burnt Stockade  
Saul Forest  
Stream &  
Quartz Rock  
Stream  
Syring  
also Quartz rock  
Mopea

Quartz in Setu  
Stream  
Mopea  
Nunklow  
Batsapani Riv  
waterfall  
very large trees  
Small nullah





**I.—Observations of the Moon and Moon-culminating Stars at *Sehāranpūr*, *Nasrabad*, and *Dholeswar*, with the Longitudes deduced.**

[Mr. BOULDERSON's observations were given to thousandths, and Col. OLIVER's to hundredths, of a second, and the calculations are made therefrom; but we have been obliged to omit the second and third decimals for want of space.]

Date.	Names of Stars.	At <i>Sehāranpūr</i> by Mr. BOULDERSON. Observed AR.	At <i>Nasrabad</i> by Col. T. OLIVER.	Date.	Names of Stars.	At <i>Sehāranpūr</i> by Mr. BOULDERSON. Dif. of AR.	At <i>Nasrabad</i> by Col. T. OLIVER. Dif. of AR.	
1833. Dec. 20	♃ 1 <i>Limb</i> , ♃ 2 <i>Piscium</i> , χ ————, ♁ <i>Ceti</i> , . . . . υ <i>Piscium</i> , . . (151) <i>Phen</i> . μ <i>Piscium</i> , O ————,	h. m. s. 0 56 0.0 59 1.9 1 2 31.3 6 1.8 10 20.3 17 18.8 21 37.9 36 36.9		1834. Jan. 20	μ <i>Tauri</i> , . . γ ————, . . . δ <sup>1</sup> ————, . . δ <sup>2</sup> ————, . . 71 ————, . . θ 1 ————, . . θ 2 ————, . . α ————, . .	h. m. s. -0 19 14.3 23 3.3 26 4.9 27 14.6 29 36.6 31 49.3 31 54.8 39 6.6		
21	β <i>Phenicis</i> , χ <i>Piscium</i> , ♁ <i>Ceti</i> , . . . . υ <i>Piscium</i> , . . (151) <i>Phen</i> . μ <i>Piscium</i> , . . (179) <i>Ceti</i> , ο <i>Piscium</i> , ♃ 1 <i>Limb</i> ,	0 58 39.3 1 2 31.4 6 1.6 10 20.0 17 19.6 21 36.7 29 18.4 36 37.5 41 48.7		23	γ <i>Geminor</i> . ε ———— δ ———— ζ ———— 51 ———— λ ———— δ ———— A ———— ι ————	+0 16 34.4 10 58.3 3 4.9 -0 9 34.4 19 9.1 23 51.7 25 31.6 28 40.7 30 44.1		
22	φ <i>Eridani</i> , . . ψ <i>Fornacis</i> , ξ <i>Ceti</i> , . . . . (267) <i>Forn</i> . ♃ 1 <i>Limb</i> , α <i>Arietis</i> , . . π <i>Ceti</i> , . . . . ε <i>Arietis</i> , . .	2 10 33.7 14 55.8 19 19.4 26 33.7 29 24.0 33 43.0 36 13.2 40 13.4		Feb. 16	λ <i>Tauri</i> , . . 48 ————, . . γ ————, . . α ————, . . 18 b <i>Tauri</i> , . . H <i>Geminor</i> . η ————	-0 26 22.5 41 14.1 45 13.4 61 15.9 .. .. ..	+0 20 10.6 -0 40 10.6 51 30.3	
26	H <i>Geminor</i> . ζ ————, μ ————, ♃ 1 <i>Limb</i> , ♃ 2 ————, υ <i>Geminor</i> .	5 54 2.2 59 39.3 6 12 54.1 13 20.3 15 48.7 19 6.7	Dif. of AR. h. m. s.		20	δ <i>Geminor</i> . ♃ 1 <i>Limb</i> , σ <i>Geminor</i> . β ———— φ ———— μ <i>Cancr</i> i, . .	h. m. s. 7 10 12.5 15 31.7 32 56.0 7 35 9.6 43 20.9 56 28.7	
1834. an. 16	μ <i>Piscium</i> , ♃ 1 <i>Limb</i> , ο <i>Piscium</i> , ξ ————, φ <i>Phenicis</i> , (212) <i>Pisc</i> . α <i>Piscium</i> , . .	.. 1 22 8.5 36 37.5 44 57.1 47 28.6 50 32.5 53 26.5	-0 43 48.5	Mar. 16	α <i>Tauri</i> , . . α ————, . . . . ζ ————, . . . . C ————, . . . . 19 μ <i>Geminor</i> . ε ———— β ————	.. .. .. .. .. .. ..	-0 28 13.5 +0 24 59.8 -0 36 20.0 -0 51 30.4 +0 34 56.6 +0 14 08.4 -0 47 17.7	
18	ξ <i>Ceti</i> , . . . . μ ————, . .	.. ..	+0 04 <sup>1</sup> 16.1 27 30.2	20	74 <i>Geminor</i> . 77 ———— β ———— 81 ———— 83 ———— ♃ 1 <i>Limb</i> , 16 <i>Cancr</i> i, . . 19 ————, F <sup>1</sup> <i>Tauri</i> , ω <sup>1</sup> ————, . .	7 29 52.7 34 24.3 .. 36 30.5 43 18.9 49 19.4 8 2 41.2 10 39.1 .. ..	+0 14 41.2	
19	μ <i>Ceti</i> , . . . . π ————, . . . . f <i>Tauri</i> , . . . .	.. .. ..	+0 20 33.7 +0 05 42.9 -0 25 10.9	Apr. 18	77 <i>Cancr</i> i, . .	..	-0 45 24.5 +0 28 27.1	

Date.	Names of Stars.	At Nasirabad by Col. T. OLIVER. Dif. of AR.	At Dholeswar by Lt. R. SHORTREDE. AR.	Date.	Names of Stars.	At Nasirabad by Col. T. OLIVER. Dif. of AR.	At Dholeswar by Lt. R. SHORTREDE. AR.
		h. m. s.	h. m. s.			h. m. s.	h. m. s.
1834.				1834.			
Apr. 18	4 Leonis, ) 1 Limb, (1173) Leon 20 Leonis, (1200)	.. .. -0 05 49.1 .. -0 26 59.5	9 22 14.6 28 19.9 40 32.0 58 16.7	Apr. 23	94 Virginis, k Virginis, α Bootis, .. 2 Libræ, .. ) 2 Limb, 27 Bootis, ..	.. .. .. .. .. ..	13 57 31.6 04 04.5 14 08 08.3 14 30.9 20 48.6 25 28.8
19	α Leonis, .. 34 —, .. 37 —, .. γ —, .. 46 —, .. ) 1 Limb,	+0 28 09.0 .. 19 53.8 16 50.4 04 19.7 ..	9 59 32.2 10 02 42.9 07 46.4 23 20.4 27 45.1	24	α 2 Libræ, ) 2 Limb, ρ Leonis, ..	.. .. +0 39 41.1	36 11.6 40 13.9 45 23.6 49 56.8 14 41 43.7 15 19 59.9
21	17 Virginis, (1434) .... ) 1 Limb, (1458) Virg.	.. .. .. ..	12 14 06.4 19 51.0 23 18.0 29 55.0	May 17	52 —, .. κ —, .. 73 —, .. υ Virginis, π —, ..	26 07.8 07 17.5 -0 03 25.5 33 35.1 48 37.7	
22	66 Virginis, ) 1 Limb, 79 Virginis, 82 —, .. 93 —, .. 99 —, ..	.. .. .. .. .. ..	13 15 56.0 20 34.1 26 15.4 32 54.3 53 33.5 14 07 20.2	18	γ Virginis, 5 —, .. π —, .. 9 —, .. 16 —, .. γ 1 —, .. δ —, ..	+0 22 03.2 17 19.3 07 00.6 02 37.7 -0 12 33.1 33 53.1 47 52.6	

From which Observations the Longitudes have been deduced as under—of

Date.	SEHA'RANPUR.			NASIRABAD.			DHOLESWAR.		
	No. of stars obsd.	Resulting		No. of stars obsd.	Resulting		No. of stars obsd.	Resulting	
		Longitude.			Longitude.			Longitude.	
		h.	m.		h.	m.		h.	m.
		5	11			4	57		
1833.									
Dec. 26	4	s.	s.						
1834.									
Jan. 16	4	8.462	- 8.462	1	s.	s.			
17	4	..	..	2	59.511	59.511			
18	4	+27.236	+ 9.387	3	51.157	53.942			
19	13	..	..	4	63.206	58.574			
20	9	+19.899	15.894						
23	9	+ 2.748	11.950						
Feb. 16									
18	3	62.738	59.962						
19	4	- 5.743	9.869						
20	5	- 8.782	7.478						
March 16									
17	1	42.248	58.191						
19	3	58.067	58.162						
19	3	64.761	59.399						
20	5	54.407	58.845						
April 18	5	-13.941	4.844	2	64.374	60.047		s.	s.
19	5	64.374	60.047	3	63.051	60.668	3	23.098	23.098
21	6	63.051	60.668	4			7	1.962	8.303
22	6	69.365	62.159	5			6	27.855	15.635
23	7	73.313	64.018	6			5	7.757	13.766
24	7			7			7	-8.056	8.301
May 17	6			8			1	-30.728	6.965
18	7								

The observations made on the second limb of the moon by Lieut. SHORTREDE, shew the necessity of observing that limb as well and as frequently as the first, with the view of determining the exact longitude of a place.

The following is a List of the Occultations of Stars by the Moon, observed by Mr. BOULDERSON, at Seháranpúr, latitude  $29^{\circ} 57' 79''$  N. longitude 5 h. 10. m. 54.1 E. with the longitudes as deduced by him.

		AR of Star.		Dec. of Star.		Menn time of Phenomenon.		Resulting Longitude.		
		h. m. s.		'	''	h. m. s.		h. m. s.		
1833.										
Feb....	27 * Tauri,.....	4	38	55,263	+	18	25	26,60	Im.11 40 0	5 10 31,6
1834.										
Jan... 20	* Tauri,.....	3	51	7,95	+	16	49	19,7	Im. 9 8 45,0	56,5
Feb.... 18	o Tauri,.....	5	17	40,165	+	21	47	16,4	Im. 9 7 7,3	45,1
19	(796)Geminorum,	6	15	27,271	+	23	24	39,84	Im. 8 49 29,3	74,6
20	(908) _____,	7	13	28,88	+	23	15	26,12	Im. 6 38 30,0	62,2
Mar.... 18	II _____,	5	54	1,508	+	23	15	53,4	Im. 9 12 44,3	49,9
	H _____,			....				....	Em. 9 46 43,3	62,9
10	3 _____,	5	59	38,38	+	23	7	58,4	Im.11 52 7,7	53,5

Mean, 5 10 54,1

Note.—The AR of these stars have been deduced from the Madras catalogue (by Mr. TAYLOR we suppose): and, with the exception of the emersion of H. Geminorum which may be in excess about  $3''$ , the mean times of the other phenomena are estimated to be correct within one second.

Of the other stars whose occultations have been observed there is but one (63 Ceti) that can be traced in Piazzi's catalogue.

Jan. 1st, 1800 63 Ceti (78) AR= $32^{\circ} 44' 30''$ 0, Annual motion  $+ 47' 34$   
Dec.  $+ 6^{\circ} 45' 6''$ ,8 ,, 16,88

The observations made by Mr. BOULDERSON and by Col. T. OLIVER would have been published in a former No. of this Journal, but that we were in expectation of obtaining other corresponding observations from some of our scientific correspondents to incorporate with them: the longitudes of the places where these observations were made have been deduced for them, for each day, with reference to Greenwich, on the supposition that the apparent AR of the stars, and of the moon, as given in the Nautical Almanac, would accord with observations made on these objects at Greenwich.

A correspondent has brought to our notice that there is, generally, about 0,5s. of difference between the apparent AR as given in former numbers of this Journal and in the Nautical Almanac for 1834. This we much regret; and the more so, as it is out of our power, at present, to apply a remedy.

In a catalogue of 720 stars, recently published by the Astronomer Royal, and from which, doubtless, the places of those in the Almanac have been taken, there are but seven which accord in AR with the catalogue of the Astronomical Society, (Mem. As. Soc. iv. 258,) while there are,

	s.	s.
94 stars whose AE differs between	0,3	and 0,4
78 .....	0,4	and 0,5
51 .....	0,5	and 0,6
37 .....	0,6	and 0,7
27 .....	0,7	and 0,8 &c.

from which it will be seen that, without that catalogue, which unfortunately we do not possess, we cannot apply a remedy to this evil.

VII.—*Proceedings of the Asiatic Society.**Wednesday Evening, the 2nd July, 1834.*

The Right Rev. the Lord Bishop of Calcutta, Vice-President, in the chair.  
Read the Proceedings of the last Meeting.

Read letter from Dr. A. HAMILTON, and Capt. WILLIAM FOLEY, acknowledging their election as members of the Society.

Read a letter from M. A. LANGLOIS, Professor of the University of France, acknowledging his election as an honorary Member of the Society.

Read extract of a letter from T. CLEMISHAW, Esq. stating that he regrets being obliged to withdraw from the Society from motives of economy.

Read a letter from H. T. PRINSEP, Esq. Secretary to Government in the General Department, forwarding copy of a letter from Monsieur CORDIER, administrator of the French Possessions in Bengal, soliciting on behalf of a learned Society at Paris, a complete set of Meteorological Tables for this country, from January, 1823, to June, 1834.

Resolved, that such records as exist for the period in question shall be placed at the disposal of the French Society.

*Library.*

Read a letter from EDWARD T. BENNETT, Esq. Secretary of the Zoological Society of London, forwarding the Journal of their proceedings, January to October, 1833, together with the first part of 1st volume of their Transactions, for presentation to the Society.

The following books were also presented :

Memoirs of the Astronomical Society of London, 6th vol.—*by the Society.*

DE LA BECHE'S Geological Manual, 3rd edition—*by the Author.*

Chrestomathie Chinoise, comprising six Chinese works, (including the *Santsuk-ing*, or Vocabulary, in three characters,) lithographed at Paris under the charge of Monsr. KLAPROTH, at the expence of the French Asiatic Society—*by the Society.*

Observation on Cholera Asphyxia, by J. HUTCHINSON, Esq.—*by the Author.*

Transactions of the Medical and Physical Society, vol. vii. Pt. 1—*by the Society.*

The Indian Journal of Medical Science, Nos. 5, 6, and 7—*by Messrs. J. GRANT and J. T. PEARSON, Editors.*

The *Bytul Pachisee*, and the second edition of the "*Vidvun Moda Taranginee*," translated into English, by RAJA KALIKISHEN—*presented by the Author.*

Meteorological Register for May, 1834—*by the Surveyor General.*

Ditto, kept at Cawnpore, for October, November, and December, 1832, and March, April, and May, 1833—*by Lieut. Col. POLLOCK, C. B.*

Read extracts from a letter addressed to the Secretary by Professor H. H. WILSON, announcing the receipt of the MOORCROFT Manuscripts sent home under charge of Lieut. BURNES, and stating that an arrangement was under negotiation to print them free of expence to the Society.

"Part of the journals, digested and corrected as I propose, have been already placed in the publisher's (MURRAY'S) hands. I sought for TREBECK'S map, at the India House for some time in vain, but at last found it had been incorporated with other cis-Himálayan maps, by Mr. WALKER in his atlas. He is willing to prepare it in as much detail as TREBECK'S field books will allow." (We have reason to know that the matter incorporated in WALKER'S atlas was taken from a

copy traced on thin paper from the original map in this country by a gentleman who visited England on furlough, in 1824, and we are not sure that copies were ever sent home officially to Leadenhall street, but rather suppose they may be still found in the archives of the Political Secretary's Office.)

Mr. WILSON alludes also to the Indo-Scythic coin brought to light by Lieut. BURNES, and attributed to Kanishca. The Greek scholars of Oxford all read the inscription KANHPKOT. No doubt the discoveries since made in Bactrian numismatics will excite great interest among the antiquarians of the University.

*Antiquities.*

Read a letter from W. STURMER, Esq. forwarding twelve pieces of metal supposed to be ancient coins, which were dug up on clearing an estate in the Sunderbuns (lot. xlv. of Capt. T. PRINSEP's Sunderbun map.)

These coins are of silver and copper, square or circular, without any proper die impression, but bearing merely small *chhāps* or *shráf* marks of various kinds. The silver pieces have an average weight of 52 grains, and have been adjusted by cutting off the corners.

Read a letter from Major L. R. STACY, bringing to the notice of the Society two coins of his cabinet, having the symbol observed in the Behat coins of Capt. CAUTLEY, united to a Greek inscription. Connected with this subject, the Secretary also exhibited to the meeting, and read a note on, a silver coin of the same type just received from Lieut. A. CONOLLY, bearing a most clear and unequivocal inscription in the illegible character, No. I. of the Allahabad column.

(We shall hasten to lay drawings of these two curious coins before our readers.)

A second letter from Major STACY drew the Society's attention to a small copper coin found in Malwa, having the image of a sphinx on the obverse.

Read a letter from Captain GEO. BURNEY on the subject of the Páli inscription at Gaya.

The impressions of the inscriptions were it seems taken off by Captain BURNEY himself in Feb. 1833, with very great trouble; and there was no Pandit in the envoy's suite; one copy was given to the Governor General, with a translation, and the other to the Burmese Ambassador. The remaining copy with the translator's observations was intended for the Asiatic Society. We regret that our ignorance of these circumstances should have caused a premature publication of the inscription, but Capt. B.'s observations will still be of equal value.

Copies of an inscription in Nagrí, Marhatta, and Tamul characters, from a stone dug up in building a new ghat at Benares, were communicated in a Persian letter from Múnshi Pal Singh, at Benares.

The stone was 29 feet long and 9 feet in girth, it seems to have belonged to a temple of no great antiquity. The inscriptions are too imperfect to be deciphered, but the example of making such discoveries known is deserving of every encouragement. They bear the date *Samvat* 1655.

*Physical.*

Specimens of the fossil shells found in the lime quarries on the banks of the Derwent river, 12 or 13 miles from Hobart Town, in Van Dieman's Land, were presented by H. T. PRINSEP, Esq.

They are identical in appearance with some of Dr. GERARD's shells from Spiti, (*spirifer striatus* of SOWERBY, a shell of the mountain limestone group.)

A fine specimen of the Kyuk-Phyoo lignite half-silicified and other minerals were presented in the name of Lieut. W. FOLEY.

A flying fish preserved in spirits, presented by J. A. WILLIAMS, Esq.

The saw of a saw-fish, 5 feet long, presented by Capt. R. LLOYD, Mar. Surv.

Read a letter from Serjeant EDMUND DEAN, of the Sappers and Miners, forwarding some selected specimens of the fossil bones discovered and collected by himself in blasting the rocks of the Jumna river, for inspection and examination.

Among the present specimens are some not found in the collections received from Captain SMITH and Lieut. BURT, from the same localities; of these the most interesting are, two teeth of the fossil hippopotamus, and a bone resembling the cervical vertebra of a camelopardalis, as compared with one in possession of Dr. J. T. PEARSON.

[This paper shall appear as soon as possible.]

Read extracts of a letter from Dr. MALCOLMSON, Secretary Medical Board, Madras, forwarding some botanical specimens collected by him at Malacca, and a report upon them, by Dr. N. WALLICH, Superintendent Botanical Garden.

Having seen the interest excited by Lieut. NEWBOLD's fern from Mount Ophir, Dr. M. obligingly sent his collection in hopes that some prize might reward the labour of their examination. Dr. WALLICH, however, finds nothing in the list which is not already well known. No. 9, only, a *Bossia*, is probably new and an interesting plant.

Dr. MALCOLMSON's letter contains the following account of fossil shells discovered in the Hyderabad country.

#### *Fossil Shells in Hyderabad.*

"In the *Neermal* hills lying north of the *Godaverí* river on the road from Hyderabad to *Nagpúr*, many very perfect fossil shells, mostly bivalves, and evidently marine, have been found imbedded in a volcanic rock; also the head and vertebrae of a fish. The formations rest almost every where on granite, and have the usual characters of this class of hills. The most interesting facts however, are the raising of some portions of the blue limestone, passing into clay-slate, by the basalt, and in one place the bursting through of the latter with very remarkable distinctness through the limestone, which is singularly altered, its silicious constituents being converted into glass-slag, and a cinder-like rock. There is a series of hot springs holding lime in solution, which is deposited in rocks on the passing off of the carbonic acid which gives the river a sour taste. The contrast between the ancient and recent fossils is very striking. The hills I find belong to the *Sehsa* range, extending S. E. to N. W. several hundred miles. In the same occurs the *Lunar* lake, (40 miles from *Jaulnah*,) which I examined some years ago. It is a vast crater nearly 500 feet deep, and four or five miles round on the upper margin. Its waters are green and bitter, supersaturated with alkaline carbonate, and containing *silex* in solution as well as some iron. The mud is black and abounds with sulphuretted hydrogen, but the water is pure and without smell. The rocks are volcanic, and springs of pure water rise out of the salt mud or

stream down the sides of the punch bowl, thus strangely sunk in a nearly level country, there being but a gentle rise to the edge. The crystals of salt found at the bottom by the divers who remove it for purposes of commerce are tabular. Between this and the hot springs of *Kair* others are found, and the direction of the range corresponds with the dykes described by VOYSEY in the Hyderabad country."

A note from Capt. F. JENKINS to the Secretary intimated the discovery of limestone in Assam.

"I find the shell lime of Sylhet extends across to Assam in the direction of *Dharmpûr*; it having been discovered on the right bank of the *Kopili*—a discovery of no small importance to us: no lime before having been known to exist in Assam nearer than the *Brahmakund*."

A Persian letter from SHEKH KERAMAT ALI at Cabul, accompanied a package of the fruit and flower seeds of that country, and some specimens of lead and antimony ores.

The seeds were unfortunately nearly spoiled on their way down by the rain. They were made over to Dr. WALLICH's care.

Extracts from the letter before alluded to of Prof. WILSON, were read.

Professor BUCKLAND had been much gratified with the duplicates of Dr. J. G. GERARD's fossil shells selected and transmitted for his examination. He found them to corroborate in every respect a view of the distribution of the *ammonites*, on the subject of which he had recently been delivering a lecture to the Ashmolean Society at Oxford: he had no doubt, although doubts had been very justly entertained before, that the formation to which these shells belonged in India was allied to the Lias of Europe. We shall look with eagerness for the report of this high authority, which promises to confirm the opinion of our associate the Rev. R. EVEREST on the subject. A most valuable article on the species and distribution of ammonites, by Dr BUCH, appears in the *Annales des Sciences Naturelles* of May, 1833, which we regret our inability to transfer to the Journal: it contains plates of all the varieties of this fossil hitherto discovered in the *Himâlaya* range.

The business of the evening being concluded, The Right Rev. the Vice-President rose and addressed the meeting:—

It had been suggested to him that the death of the Rev. Dr. CAREY, one of the oldest and warmest supporters of the Asiatic Society, was an occasion which called for some testimonial of the sense entertained by all its members of the value of his services to the literature and science of India, and of their sincere respect for his memory.

He had himself enjoyed but two short interviews with that eminent and good man, but a note from Dr. WALLICH, who was prevented himself from attending to propose the resolution, supplied his own want of information. Dr. CAREY had been 28 years a member of the Society: and (with exception of the last year or two of his life, when protracted illness forced him to relinquish his Calcutta duties), a regular attendant at its meetings, and an indefatigable and zealous member of the Committee of Papers since the year 1807.

He had enriched the Society's publications with several contributions:—an interesting report on the agriculture of Dinajpur, appeared in the tenth volume of the *Researches*. An account of the funeral ceremonies of a Burman priest in the twelfth:—The catalogue of Indian medicinal plants and drugs in the 11th vol. bearing Dr. FLEMING's name, was also known to have been principally derived

from his information and research. As an ardent Botanist, indeed, he had done much for the science in India, and one of the last works upon which he had been engaged, was the publication, as Editor, of his deceased friend Dr. ROXBURGH'S *Flora Indica*.

His Bengalee, Marhatta, Telinga, and Punjábí dictionaries and grammars, his translation of a portion of the Ramáyana, and other works, were on our shelves, to testify the extent of his learning as an oriental scholar. It was well known that he had prepared some time ago an elaborate dictionary of the Sanscrit language, the manuscripts of which, and a considerable portion of the work already printed off, the result of many years' intense labour and study, had been destroyed by the fire which burnt down the Serampore premises. He had also been of great assistance, as the author testified, in the editing of Bahoo RAM COMUL SEN'S Anglo-Bengalee Dictionary.

The memory of those members, who had been longer associated with him than himself, would easily fill up this very imperfect estimate of his various services.

During 40 years of a laborious and useful life in India, dedicated to the highest objects which can engage the mind— indefatigable in his sacred vocation, active in benevolence, yet finding time to master the languages and the learning of the East, and to be the founder, as it were, of printing in these languages, he contributed by his researches, and his publications, to exalt and promote the objects, for which the Asiatic Society was instituted. The close of his venerable career should not therefore pass without a suitable record of the worth and esteem in which his memory was held; and His Lordship begged to move that the following minute be entered on the Journals of the Society:—it was seconded by Colonel Sir JER. BRYANT, and carried unanimously:

“The Asiatic Society cannot note upon their proceedings the death of the Rev. WM. CAREY, D. D., so long an active member and an ornament of this Institution, distinguished alike for his high attainments in the oriental languages, for his eminent services in opening the store of Indian literature to the knowledge of Europe, and for his extensive acquaintance with the sciences, the natural history and botany of this country, and his useful contributions in every branch towards the promotion of the objects of the Society, without placing on record this expression of their high sense of his value and merits as a scholar and a man of science; their esteem for the sterling and surpassing religious and moral excellencies of his character; and their sincere grief for his irreparable loss.”

### VIII.—*Indian Zoology.*

*Notices extracted from the proceedings of the Zoological Society of London.*

*January 22, 1833.*

Mr. BENNETT called the attention of the Society to a stuffed specimen of an *Antelope*, from the southern part of the peninsula of India, which had been presented to the Society several months since by CHARLES TELFAIR, Esq., Corr. Mem. Z. S. He remarked, that notwithstanding some discrepancies between the specimen exhibited and the description published by PALLAS, he was disposed to regard



it as the young of the *Indian Antelope*, *Antelope Cervicapra*, PALL. Its general colour is pale fawn, and it has a paler streak on each side, passing from the shoulders to the haunches; characters by which, as well as by the form of its horns, the pale circle surrounding the eyes, and the white patch under the tail, it agrees with the young of the *Indian Antelope*: but it differs by the fawn colour extending down the sides to the under parts of the body, which are merely of a lighter shade than the upper, and are not pure white; and by the length of the ears, which does not exceed 4 inches, while in no specimen of the *Indian Antelope* possessed by the Society, is the length of these organs less than 5 inches. The latter circumstance is so remarkable, as to suggest the necessity of further inquiries into the history of the race from which this individual was derived. Its age may be conjectured from the size of its horns, which have made two nearly complete turns, and are surrounded by eighteen rings.

Specimens were exhibited of the adult male of the *lineated Pheasant*, *Phasianus lineatus*, LATH., and of two immature birds of the same species: for the whole of these the Society is indebted to GEORGE SWINTON, Esq., Corr. Mem. Z. S. The immature birds died on their passage to this country; the adult skin was obtained from the Tennasserim coast.

At the request of the Chairman, MR. GOULD made some observations on these specimens. The adult bird differs in some particulars from the description published by DR. LATHAM. "Its total length is 2 feet 8 inches; the length of the wings, from the shoulder to the end of the longest feather, 9 inches; of the beak, from the gape to the tip,  $1\frac{1}{2}$  inch; of the *tarsus*,  $3\frac{1}{4}$  inches; and of the tail, 1 foot 2 inches.

"The beak is stroug, and considerably arched; the naked space round the eye bright red, and covered with numerous *papillæ*; the head crested with long glossy blue-black feathers; the back of the neck, and whole of the upper surface, delicate grey, very numerously barred with fine zigzag lines of black; which are broader on the quill feathers; the throat, breast, and belly, black; the sides of the breast and flanks having white lanceolate feathers with black edges; the tail, of eighteen feathers, very much graduated, and arched, as in the *Silver Pheasant*, *Phasianus Nycthemerus*, LINN., the outer edge of the two centre feathers, and the tips of the two next, being white; the remainder are alternately marked with irregular lines of black and white, the black predominating; and the legs strong, of a reddish flesh colour, furnished with conical sharp spurs.

"The two immature birds are alike in colouring, and appear to be male and female. They differ very materially from the adult, and very much resemble the female or the young male of the *Silver Pheasant*. They are about 18 inches in length; wing,  $8\frac{1}{2}$  inches; *tarsus*,  $2\frac{3}{4}$ ; beak,  $1\frac{1}{2}$ ; tail, 10. The head is crested with feathers nearly 2 inches long, of a reddish brown, obscurely marked with minute zigzag lines of black; the naked skin round the eye is not so much developed as in the adult male; the neck, throat, breast, and under parts are brown, each feather having a lancet-shaped mark of white; the whole of the back and shoulders brown, minutely sprinkled with a darker colour; the quill-feathers brown, having the outer edges barred with yellowish white; the secondaries brown, with oblique, irregular, and narrow lines of a lighter colour; the tail irregularly barred, and dotted with rich brown and yellowish white; the legs and feet reddish brown."

February 12, 1833.

A note from Col. HALLAM was read, accompanying drawings of the *Mango-fish*, *Polynemus paradisæus*, LINN.; and of two individuals of a race of *pigs* with only

two legs, the hinder extremities being entirely wanting. The latter, Col. HALLAM states, were observed "at a town on the coast in the Tanjore country, in the year 1795: they were from a father and mother of a similar make, and the pigs bred from them were the same."

June 11, 1833.

Specimens were exhibited of various *Mammalia*, *Birds*, and *Reptiles*, from the continent of India, which had been recently presented to the Society by THOMAS HEATH, Esq. Mr. BENNETT observed on the several objects, pointing out especially the more interesting among them. They included an individual apparently referrible to the *Semnopithecus cucullatus*, Isid. Geoff. St.-Hil., although darker in all its markings than is indicated in the description given by the original observer of the species. They also included a species of *Felis*, of a size intermediate between the larger and the smaller animals of that genus, and having in its grey colour and longitudinal striping a general external resemblance to some of the *Viverræ*. This Mr. BENNETT regarded as new to science, and proposed to designate it

*FELIS VIVERRINUS. Fel. fulvo-cinereus, subtilis albescens; capite, nuchâ, dorso, genis, gulâque nigro vittatis; lateribus, ventre, pedibusque nigro maculatis.*

Long. corporis cum capite, 33 unc.; caudæ mutilæ, 7; auriculæ, 1½.

The prevailing colour of the upper surface is a rather deep yellowish grey, the separate hairs being dusky at the base, yellowish in the middle, and having short black tips. The black lines and spots are formed of hairs destitute of yellow, and having the black tips of much greater length. A longitudinal black band passes on each side from the inner *canthus* of the eye above the ear nearly to the shoulder; a second, more internally, passes to the same distance backwards, and is somewhat interrupted anteriorly; and between this and its fellow on the *vertex* is the vestige of a median line, which on the forehead is broken up into a double row of spots; these and the two adjoining lines subdivide in front into numerous very small spots between the eyes. Two black lines pass downwards obliquely on either side from below the eye, over the angle of the jaw; and from their terminations on each side there passes a transverse band across the throat: the space between these lines is nearly white, as is also a stripe over each eye, and the whole of the under jaw and chin. There is a large black spot surrounding the base of the ear posteriorly, and the ear is also tipped with black. The long, linear, markings of the back are disposed in about five interrupted, longitudinal bands, and some of the spots on the sides assume a linear form. Of these the most remarkable are, one on each side of the neck, and an oblique wavy band on the shoulder. The spots on the sides generally approach a rounded shape, and form, posteriorly, four or five interrupted longitudinal rows. Those of the under surface are larger, and are arranged without order. On the fore limbs the spots are small externally, and internally there are on each two large transverse black patches. On the hinder limbs the spots are arranged so as to form interrupted transverse bands on both surfaces. The hairs of the soles of the feet are dusky brown. The tail is spotted above in the same manner as the sides; its colour beneath is uniform. The spots are throughout numerous. The whiskers are white, and take their origin from three black lines on either side.

The species is nearly allied to *Felis Serval*, SCHREB., but will readily be distinguished by the characters above given, by the comparative shortness and strength of its limbs, and by the locality whence it was obtained.

Col. SYKES reminded the Society that, in submitting his catalogue of the *Mammalia* observed in Dukhoo, East Indies, he took occasion to comment on the

popular error respecting the ferocious and untameable disposition of the *common Hyæna*, *Hyæna vulgaris*, CUV. His opinions were founded partly on observation of a cub which he had domesticated, and partly on facts communicated by his friends. He went on to state as follows :

“ Two years have elapsed since I placed in the Gardens of the Society the above-mentioned cub (a female), which has now attained its full growth, and I am happy to be enabled to confirm the opinions I formerly advanced. In India it was allowed to run about my house, and on board ship it was released from its cage two or three times a day, to play with the sailors and gambol with the dogs. It early recognised my person and voice, and would obey when called ; and in general was as playful and good-humoured as a puppy. My visits to it in the Gardens have been rare, and at long intervals, nor have I ever carried it food ; I anticipated, therefore, that it would outgrow its early associations, and that I should be to it as any other stranger ; but it has always greeted me not only as an acquaintance, but as an old friend ; and if I am to judge from its agitation and peculiar cries, the animal's recognition is that of affection.

“ On Sunday last it was asleep in its cage when I approached. On calling to it by its name it looked up, distinguished me in the crowd, started on its legs, and on my applying my hand to its mouth to smell to, it threw itself down against the bars, rubbed its head, neck, and back against my hand, and then started on its legs and bounded about its cage, uttering short cries. On ceasing to speak to it, and moving away, it stopped, and looked wistfully after me, nor resumed its motions until I addressed it again. Its manifestations of joy were so unequivocal, as to excite the surprise of a great number of bystanders. As these pleasing traits in the disposition of a calumniated animal appeared so new to those who surrounded me on that occasion, they may possibly be deemed of sufficient interest to be worthy of extended promulgation by record in our Proceedings.

“ I take occasion to repeat my conviction, that association with man, constant kindness, and abundance of food, will suffice not only to modify, and indeed eradicate, the worst traits in the disposition of any animal of the higher classes, but give birth to others of which their natures were not deemed susceptible.”

September 10, 1833.

A letter was read, addressed to Mr. VIGORS by B. H. HODGSON, Esq., Corr. Memb. Z. S., and dated Nepál Residency, February 23, 1833. It referred to the zoological specimens which the writer had forwarded to Calcutta, to be thence transmitted to England, some account of which, as contained in a letter from Mr. PRINSEP, was read at the last Meeting.

[The account given of the Mammalia of Nepal in this day's proceedings has already appeared in the Journal for 1832. A letter from Mr. BENNETT, Sec. Zool. Soc. gives a sad account of the result of Mr. HODGSON's consignment of animals : of the few which remained alive to be shipped by the *Susan*, in April, 1833, none reached England ! One of the deer leaped overboard, the other knocked itself to death against the bars of its cage. The pheasants and pigeons lived until the vessel got into the colder latitudes, when they died one after the other ! a most unfortunate termination of an attempt from which much had been hoped, and on which no trouble or expense had been spared by our zealous naturalist.]

A “ Description of *Perdix Lerwa*,” by B. H. HODGSON, Esq., Corr. Memb. Z. S., was read. It was accompanied by a coloured drawing of the bird, which inhabits the northern region of Nepál, and forms, by its half-plumed *tarsi*, a sort of link between the *Partridges* and the *Grouse*. Its habits assimilate with those

of the latter genus. It is found close to the permanent snows, among rocks and low brushwood, and sustains itself upon aromatic buds, leaves, and small insects. It is characterized as follows:

**PERDIX LERWA.** *Perd. nigra, albo castaneoque transversim lineata; pectore brunneo; tarsi ultra calcar plumosis, remige 2da longiore.*

The great comparative expanse of the wing; the diminution of its rounded form by the second quill feather being the longest; the increased length and strength of the tail; and the extent of the feathering of the *tarsi*, are very remarkable characters, which give to this species a peculiar interest. Its dimensions, as compared with several allied birds, are given by Mr. HODGSON in the following table:

	<i>Perd. Lerwa.</i>	<i>Perd. Chukar.</i>	<i>Perd. Gularis.</i>	<i>Perd. Francolinus.</i>
Length, from the tip of the bill to that of the tail . . . . .	1·2 $\frac{3}{4}$	1·1 $\frac{1}{2}$	1·2 $\frac{1}{4}$	1·2
Length of the bill . . . . .	1	1 $\frac{1}{8}$	1	1 $\frac{1}{8}$
Basal height of ditto . . . . .	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{7}{8}$	$\frac{3}{8}$
Basal breadth of ditto . . . . .	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{5}{8}$
Length of the tail . . . . .	4 $\frac{5}{8}$	3 $\frac{1}{2}$	4 $\frac{1}{2}$	3 $\frac{1}{2}$
Expanse of the wings . . . . .	1·11 $\frac{1}{2}$	1·8	1·9 $\frac{1}{4}$	1·8
Length of the <i>tarsi</i> . . . . .	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2 $\frac{5}{8}$	2 $\frac{1}{4}$
Length of the central toe and nail	1 $\frac{6}{8}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$
Weight . . . . .	1 lb. 2 oz.	1 lb. 2 oz.	1 lb. 2 oz.	1 lb.

September 24, 1833.

A collection of skins of *Birds*, sixty-four in number, formed in the Himalayan Mountains, and presented to the Society by Lady WILLIAM BENTINCK, was exhibited. It included several species apparently new to science, and was particularly rich in the interesting *Pheasants* of the Himalaya. The collection was remarkable on account of the fine condition of the specimens, which generally surpassed in beauty those previously contained in the Society's Museum.

A series of eighty skins of *Birds*, selected from a collection formed in India by H. B. HILLIER, Esq., and presented by that gentleman to the Society, was exhibited. It comprised specimens of many species in fine or interesting plumage.

[This day's proceedings also contains a note of Mr. HODGSON's papers on the Chira antelope and the wild dog of Nepál, published in the Gleanings and Asiatic Researches.]

October 8, 1833.

A letter was read, addressed to the Secretary by W. A. WOOLER, Esq., and giving an account of a *wild Dog* from the Mahabaléshwar Hills, now known as Malcolm's Pate, in the Presidency of Bombay: its local name is *Dhale*. The habits of this *Dog*, in a state of nature, are described by Mr. WOOLER: they accord with those of the *Búansú* of Nepál, as detailed by Mr. HODGSON in a paper read at the previous Meeting of the Society.

### Miscellaneous.

#### 1.—On Spherical Mirrors.

It would appear from the undermentioned paragraphs, which have been extracted from HUTTON's *Mathematical Recreations*, vol. ii. p. 201, that opticians have not yet determined the reason why objects on being reflected from convex and concave mirrors appear of less magnitude in the former, and of greater in the latter; than they really are. Now, nothing appears to me to be more easy of demonstration, for let us suppose a cylinder having its outer surface so polished as to reflect distinctly

all objects surrounding it. In the next place, let us imagine another cylinder, a hollow one, to be placed concentric with the former, but at such a distance on the outside of it, that any object situated on the inner surface of the outer cylinder, may be distinctly reflected upon the outer surface of the inner one.

Now as every particle in the outer cylinder is reflected from that part of the inner one which is situated immediately and perpendicularly opposite to it, it is evident that the whole of the outer cylinder is represented on the polished surface of the inner one, but the latter being on account of its interior situation the smaller of the two, it follows that every object that is situated on the inner surface of the outer or larger cylinder, must be represented on a smaller scale (as far as its lateral measurement is concerned) upon the polished surface of the inner and smaller one, than it really is in the other, which contains the real size or dimensions of the object.

It may be easily seen then, that if a polished globe or a polished segment of a circle similar to a convex mirror be substituted for the inner cylinder, the same reasoning must hold good, for each dimension of the image, in which case the reflected objects must become diminished both in height and diagonal measurement, as well as breadth, merely because the surface upon which they are represented is less than that of the objects themselves.

So much for the reduction of the spectrum or image of objects in convex mirrors, and as to the increase of it in concave ones, the reasoning must be exactly the same, as for the above, excepting that the object must then be considered as situated on the outer surface of the inner cylinder, which should be unpolished, and be reflected from the inner polished surface of the outer one, in a magnitude of course greater than the object itself, in proportion to the increased radius of the outer mirror.

I cannot but express a difference with the common opinion, that the place of the spectrum in the convex mirrors is at H., see the accompanying figure numbered in HURTON, fig. 30, plate 9; it may surely with fairness be considered to be at M., that is exactly at the same distance within the mirror measured on the prolongation of the line of reflection, as the object is distant from the point of incidence, in the same manner as in a plane mirror; for although the object or rather its image arrive at the eye in a reduced size when reflected from the convex mirror, yet by the above reasoning, with the two cylinders, it is easily explained, for the image of the object, having fallen from without upon the convex surface of the mirror which is situated within and which in this case corresponds as it were with the inner cylinder above noticed, has become itself reduced in size, and being so reflected, proceeds towards the point of sight in that diminished state, and therefore it necessarily appears to the eye when reflected from the convex mirror less in size than it really is, and by a parity of reasoning, greater in size when reflected from a concave one.

In my opinion, the image (with the exception above noted of its being reduced in size, by its actual contact with the speculum without the eye having any thing to do with that reduction) is not only situated at the same distance above described within the mirror, as the object is distant from the point of incidence, but it becomes reflected from a convex mirror in exactly the same manner that it would be from the polished surface of a plain one, such as F. G. where the angles B. E. F. A. E. G. formed by the lines of incidence and reflection, B. E. E. A., with the speculum are always equal to one another.

*Extracts for Hutton's Mathematical Recreations, vol. ii. p. 201.*

“A more philosophical principle advanced by Dr. BARROW is, that the eye perceives the image of the object in that point where the rays forming the small divergent bundle, which enters the pupil of the eye, meet together. It is indeed natural to think that the divergency as it is greater when the object is near, and less when it is distant, ought to enable the eye to judge of the distance.”

“By this principle, also, we are enabled to assign a pretty plausible reason for the diminution of objects in convex, and their enlargement in concave mirrors; for the convexity of the former renders the rays which compose each bundle that enters the eye more divergent than if they fell on a plane mirror, consequently the point where they meet in the central ray produced is much nearer. It may even be demonstrated that in convex mirrors it is much nearer, and in concave, much farther, distant than the point H., considered by the ancients, and the greater part of the moderns, as the place of the image. In short, it is concluded that in convex mirrors, this image will be still more contracted, and in concave ones, more extended than the ancients supposed; which will account for the apparent enlargement of objects in the latter, and their diminution in the former.”

“We must allow that even this principle is attended with difficulties, which Dr. BARROW, the author of it, does not conceal, and to which he confesses he never saw a satisfactory answer.”

2.—*Replies to Lieut. Burt's Questions, by Lieut. W. S. Jacob, Engineers.*

SIR,

Having just seen in your No. for December last, several questions proposed by Lieut. BURR, Eng. I take the liberty of sending you the following answers to them, for insertion in your Journal, should none more satisfactory have been received in the mean time.

Reply to Q. 1st. The longest known period of any comet that has appeared twice is about 575 years, but it was calculated that of 1811 would return in not less than 3000 years; then by KEPLER'S rule, the major axis of its orbit  $= 2d \times (3000)^{\frac{2}{3}} = 2d \times 208$  nearly, ( $d$  being the mean distance of  $\ominus$  and  $\odot$  :) now it is very certain, that no star has an annual parallax of  $2''$  (nor probably  $1''$ ), consequently the nearest star will be distant more than  $2d \times 100,000$ , or nearly 500 times as far as the furthest known comet. There may, however, be others more distant, which have never appeared to us; but as the period of one, which should extend from our system to another star, would be at least 11,000,000 years, it is not easy to see, what connection this could form between the two systems.

Q. 2nd. Supposing the moon to have an atmosphere like our own, this would be insufficient to render visible the whole of her dark disc, for we find that, on the earth, the sun's light is extended by refraction to barely  $18^\circ$  beyond the limit of direct vision, instead of  $90^\circ$ , as it appears to be in the moon. The phenomenon alluded to is much more simply accounted for by the light reflected from the earth, which will be nearly 14 times greater than what we receive from the moon. The limit of light and darkness on the moon's disc is more clearly defined than it could be, if she were surrounded by an atmosphere like ours.

With regard to the law of attraction of fluids, I conclude it to be the same with that of all other bodies, viz. that they are attracted in proportion to their mass, or in equal bulks, directly as their specific gravities; as far as I know there is neither fact nor analogy to support the idea that the attraction is either directly or inversely as the cube root of the specific gravity.

With regard to the tides, Lieut. BURT appears to have rather overestimated them, for the height of the mean lunar tide wave is about five feet, and of the solar, two feet, so that the total spring-tide, unaffected by local causes, will be seven feet, instead of 12½. Also the mean depth of the sea is usually estimated at much more than ½ or even than 1 mile, but it is difficult to perceive any connection between this depth and the height of the tide; for were the whole earth a globe of water, it would, I conclude, assume the same figure, when acted on by the same forces, as in its present state; supposing, of course, gravitation to remain unaltered. But if the height of the tide be  $\frac{1}{38} \times$  the depth of the fluid, it is evident that Lieut. BURT has made an error in his calculation; for in that case, the mercury in the barometer will be raised to  $\frac{1}{38} \times$  its own height, or 30 inches; now  $\frac{1}{38} = \frac{1}{48}$ , or more than  $\frac{1}{48}$ , instead of  $\frac{1}{38}$  inch. This mistake has arisen apparently from the indirect mode of calculation which he has used, thus unnecessarily increasing the number of figures, and of course the liability to error; in the quotient of  $5\frac{1}{2} \div 138$ , the decimal point is wrongly placed.

It is certain, however, that the tide does not raise the mercury 0.2 inch, but if the barometer be carefully observed at the times of high and low water, it is possible that a very small difference may be perceived; which, however, will be accounted for by the fact that at these times the height of the observer above the sea is actually changed, or in other words, the atmosphere is raised and lowered by the tide of water, so that strata of different densities are brought in contact with the mercury.

I cannot conceive how the moon's attraction, by *opposing* gravitation, could increase the weight of the air or any other body; it would produce a contrary effect, and cause the mercury to fall, were it not that its weight also is diminished in the same proportion with that of the air, so that the one will continue to counterpoise the other, as if acted on by gravity alone. It is evident, then, that the barometer is utterly incapable of indicating either the amount or existence of a tide in the atmosphere.

As Lieut. BURT does not know the temperature of red-hot iron, it may be well to bear in mind that the zero of Wedgewood's pyrometer is fixed at the lowest red heat visible in day-light. [This instrument has been proved greatly incorrect.]

Soolkee, Feb. 10th, 1834.

I remain, &c.

The Burmese philosopher prince seems to have excited the talent of many champions of science. A writer in the Madras Literary Gazette has taken up a new ground in his reply, and insists that a comet is as cool and habitable when shining on the solar disc as when wandering in its aphelion darkness. We shall venture no remark ourselves, as we think the prince has now had enough of a discussion which any of our standard elementary works would fully explain to him.—ED.

*Asiatic Society of Paris, 2nd Sept. 1833.*

A letter was read from Mr. LEWIS DACOSTA, presenting a prospectus and specimen of a work on Universal History, translated by him into Persian. The author at the same time presents a copy of NARES' Elements of Natural History, ancient and modern, translated into Hindustani, by Mr. DACOSTA. Both works were referred to the *Journal Committee*.

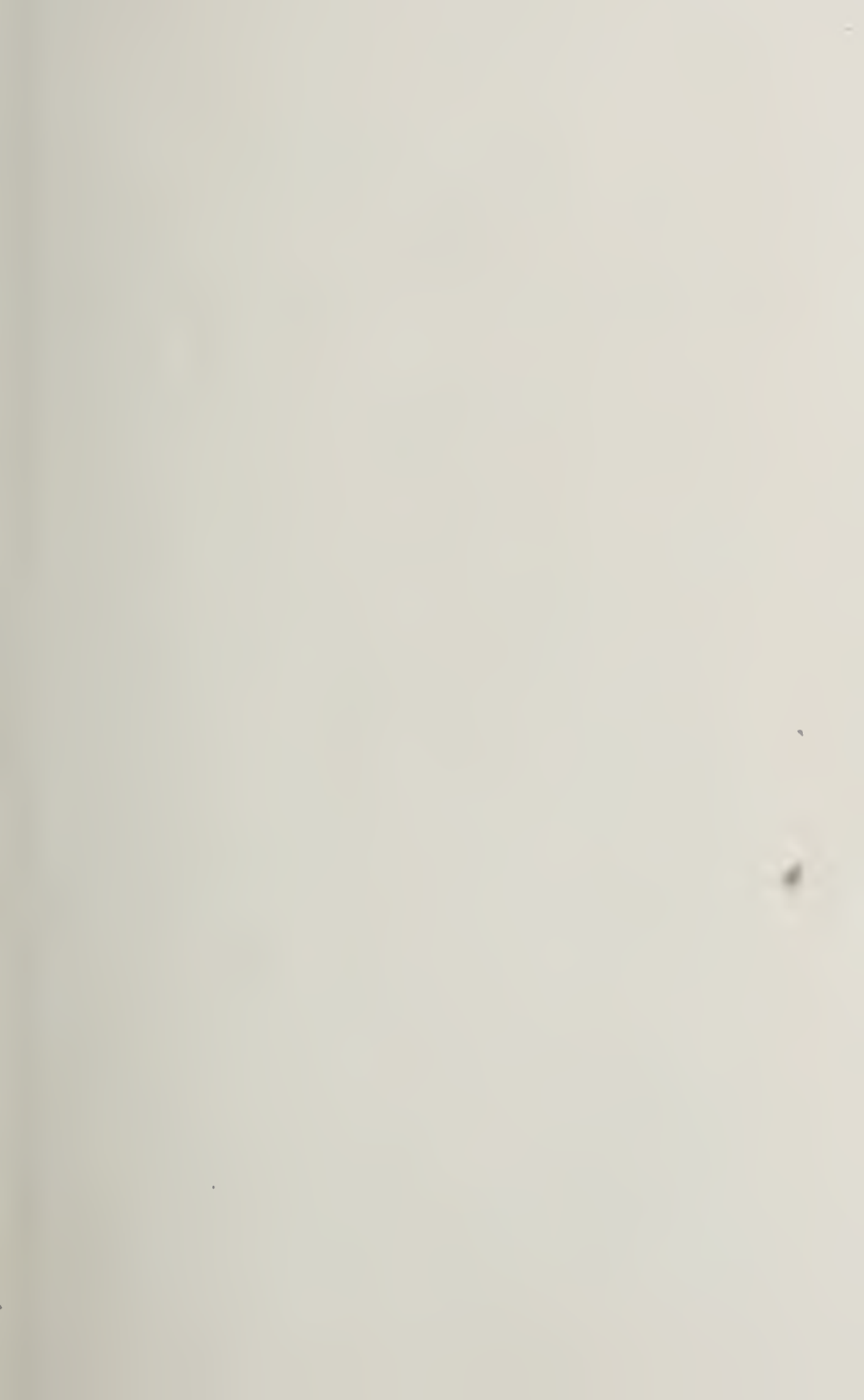
Mr. MOHL, in the name of the Committee, appointed last Meeting, proposed to admit as Honorary Members of the Society, Messrs. PRINSEP and HARKNESS, Secretaries, one of the Asiatic Society of Calcutta, the other of the Asiatic Society of Bengal—(read *London*; a curious mistake to occur in an Oriental Journal). This proposition was carried.

*Meteorological Register, kept at the Assay Office, Calcutta, for the Month of June, 1834.*

Days of the Month.	Barometer reduced to 32° Fahr.			Thermometer in the Air.			Depression of Moist-bulb Thermometer.			Hair Hygrometer.		Rain. Inches.	Wind.		Weather.				
	At 4 A.M.	At 10 P.M.	At 4 P.M.	Minimum at 4 A.M.	At 10 A.M.	Max. by Reg. Ther.	At 4 P.M.	At 10 P.M.	At 4 P.M.	At 10 P.M.	Morning.		Evening.	Morning.	Evening.	Morning.	Evening.		
																		At 4 A.M.	At 10 P.M.
1	462	502	482	37.1	92.4	100.0	95.8	83.0	3.1	5.4	10.0	5.0	91	86	.40	s. e.	hazy sky.	clear.	storn.
2	480	504	474	38.0	91.3	101.0	97.8	83.1	3.0	7.3	10.5	5.3	91	85	.75	s. s.	cloudy.	overcast.	viol. storn.
3	493	501	472	39.0	90.4	97.8	93.3	83.8	3.0	7.4	10.1	6.0	90	86		s. s.	do	threatening.	cloudy.
4	501	508	466	38.2	90.0	92.2	96.8	84.0	2.5	8.3	7.6	4.0	93	94		n. w.	do	clear.	do
5	534	512	461	38.4	89.6	94.6	95.1	85.2	1.4	0.0	14.2	3.8	91	80		S. S.	cloudy.	do	rain.
6	618	540	400	37.0	88.3	90.4	94.2	84.9	4.3	8.0	0.2	0.0	82	80	.10	S. E.	stratus.	cloudy.	storn.
7	547	530	474	36.1	89.4	98.2	91.6	78.2	1.9	6.1	7.8	1.6	94	93	3.85	S. w.	do	do	clear.
8	632	600	520	37.0	89.4	90.8	89.0	83.2	2.3	5.9	7.0	3.4	93	94	.05	s. o.	clear.	do	cloudy.
9	627	637	574	38.2	88.4	91.2	87.3	79.4	0.9	5.8	5.5	2.7	93	94		s. w.	haze.	do	clear.
10	600	630	548	39.2	87.0	92.0	86.2	81.0	0.9	6.0	6.0	1.6	95	94	.40	n. e.	hard rain.	rain.	cumuli.
11	568	581	516	37.2	82.9	85.4	83.4	80.0	2.0	4.3	6.3	2.2	96	93	.25	n. e.	stratus.	overcast.	cldy. rn.
12	536	570	486	36.0	85.0	91.4	84.2	81.0	2.2	4.6	4.2	1.6	96	97	.45	n. e.	cloudy.	cloudy.	cumuli.
13	518	541	470	35.0	82.9	90.0	86.2	83.0	1.9	3.6	5.4	4.7	97	96	.45	e.	cumuli.	do	cum. cir.
14	607	595	510	38.0	82.0	86.7	85.4	81.4	1.9	3.4	5.4	3.0	98	96	.60	s. e.	clear.	do	stratus.
15	580	529	429	36.2	80.2	85.8	87.2	83.4	0.7	4.6	6.1	2.3	97	96		s. w.	do	do	cir.
16	569	525	424	34.4	82.1	85.8	86.0	81.7	2.3	5.0	3.4	1.3	96	98	.15	e.	cloudy.	hazy.	threatening
17	507	430	430	30.4	82.0	87.0	89.0	84.7	1.7	3.8	5.0	1.7	98	97	.15	e.	stratus.	stratus.	cir. cum.
18	424	410	331	30.6	82.0	86.2	87.8	86.0	1.6	3.8	5.0	4.6	96	97	2.45	s. s.	hard rn.	cumuli.	cum. strat.
19	335	371	297	34.1	80.1	85.3	87.6	87.0	84.3	3.2	3.9	3.2	97	99		s. s.	do	do	do
20	322	345	280	40.9	80.3	84.4	90.0	84.4	81.9	3.0	4.6	1.9	97	99		S. S.	haze.	rain.	do
21	349	406	342	42.9	82.0	87.4	94.0	91.4	85.4	1.0	5.4	6.8	96	95		S. s.	bank S.	do	scud.
22	519	469	418	38.1	84.6	88.1	95.8	89.6	85.0	1.8	3.9	2.5	97	95		S. s.	cir. cum.	do	clear.
23	569	535	472	39.8	83.5	91.8	90.7	83.2	1.0	6.5	7.5	2.0	94	92		S. o.	haze.	do	uncli.
24	415	561	472	38.0	83.0	86.6	90.2	89.5	86.2	1.0	4.9	5.9	96	95	.03	S. e.	clear.	cumuli.	strong wd.
25	416	540	440	38.0	84.0	87.0	91.4	87.3	86.0	5.0	5.2	4.9	97	96	.15	S. s.	cum. strat.	rain.	clear.
26	445	513	410	37.3	84.8	87.3	92.9	82.9	2.8	4.1	5.8	2.7	98	95	2.35	n. w.	cum. cir.	do	heavy rain.
27	401	534	550	37.2	87.1	89.8	87.3	78.2	2.0	3.6	5.5	2.1	98	95	0.99	n.	gale.	hard rain.	do
28	491	510	452	37.8	84.2	87.1	89.8	87.3	1.0	3.1	3.2	0.9	99	98	4.45	s. e.	haze.	do	nimbi.
29	469	476	420	35.3	86.4	83.3	85.7	83.2	79.0	3.1	3.2	1.4	99	99	1.45	e.	do	overcast.	rain.
30	453	404	404	38.4	83.8	86.7	84.9	80.6	0.6	3.0	3.9	1.1	98	99	.65	e.	clear.	cloudy.	cumuli.
Mean,	29,500	530	450	38.8	87.0	91.3	87.8	82.3	2.0	4.8	6.1	2.7	95	94	18.63	calms and south.	rain early and heavy.		

The instruments for 10 A. M. and 4 P. M. are suspended in the free air of the Laboratory, those for 5 A. M. and 10 P. M. in the south veranda of a third story near the cathedral. The register thermometer for extremes is also in the same veranda. The expected Standard Barometer is just arrived in the N. P. N. P. N. P.







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